

# **Night Vision and Electronic Sensors Directorate**

AMSRD-CER-NV-TR-220

## **Breaching the Devil's Garden The 6<sup>th</sup> New Zealand Brigade in Operation Lightfoot The Second Battle of El Alamein**

January 2005

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Fort Belvoir, Virginia 22060-5806



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## Breaching the Devil's Garden The 6<sup>th</sup> New Zealand Brigade in Operation Lightfoot The Second Battle of El Alamein by

William Schneck

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Countermine Division  
FORT BELVOIR, VIRGINIA 22060-5806

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
<small>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.</small>				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE May 2004		3. REPORT TYPE AND DATES COVERED Final
4. TITLE AND SUBTITLE Breaching the Devil's Garden - The 6th New Zealand Brigade in Operation Lightfoot, The Second Battle of Alamein			5. FUNDING NUMBERS	
6. AUTHOR(S) William Schneck				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Night Vision and Electronic Sensors Directorate 10221 Burbeck Road Fort Belvoir, VA 22060-5806			8. PERFORMING ORGANIZATION REPORT NUMBER  AMSRD-CER-NV-TR-220	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES NONE				
12a. DISTRIBUTION / AVAILABILITY STATEMENT  Authorized for Public Release; distribution unlimited.			12b. DISTRIBUTION CODE  A	
13. ABSTRACT (Maximum 200 words) This study is one in a series that will examine combat breaching operations. Other studies have covered Operation Citadel and Operation Desert Storm. In this report, the breaches created in the zone of the 6th New Zealand Brigade are studied in detail. This report has been structured such that the situations of both sides are discussed, followed by a detailed narrative of the operation. Of particular interest to students of military engineering, is the effect of the lack of antipersonnel mines on the effectiveness of the "Devil's Garden." Although this was forced on Generalfeldmarshall Rommel and his men by logistic constraints, it should be of current interest as our soldiers are stripped of conventional mines by 2010.				
14. SUBJECT TERMS			15. NUMBER OF PAGES 296	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT  None	

# 1. PREFACE

The 8<sup>th</sup> Army's breaches of the "Devil's Gardens" at El Alamein were the first large-scale countermine operation to be conducted by the western Allies where mechanical mine breaching equipment was used. This tactical innovation was forced on the 8<sup>th</sup> Army because the *Deutch-Italienischen Panzerarmee* had emplaced massive numbers of mines in an intricate design dubbed "the Devil's Gardens." These Axis minefields required an equally massive allied countermining response; there were simply not enough combat engineers to meet the demands for the countermining operations in the traditional manner. This response involved the energies and attention of every level of command in the 8<sup>th</sup> Army. This effort would ultimately enable General Montgomery's army at the Second Battle of El Alamein to engage in the most successful and largest scale countermining operation by the Western Allies in the Second World War. These operations were carefully planned and rehearsed before the battle. The tactics and techniques employed were thoroughly rehearsed in one of the most intensive countermine training programs ever conducted by a field army. (As veterans of the National Training Center know, opposed deliberate breaching operations are one of the most difficult and complex tasks that a unit can undertake.) An equally intensive pre-battle research and development program conducted in the field by the Royal Engineers of the 8th Army supported the field training effort. The efforts of the men to develop practical solutions were outstanding, with the men in the workshops of the Royal Electrical and Mechanical Engineers often providing the expertise needed to manufacture the equipment designed in the field. Nevertheless, after everything was said and done, it was the dismounted sapper, bayonet in hand, who would force the vast majority of the breaches through the "Devil's Gardens."

This study is one in a series that will examine combat breaching operations. Other studies have covered Operation Citadel (the German attack at Kursk in 1943) and Operation Desert Storm. Other studies may be undertaken as time and resources permit. In this report, the breaches created in the zone of the 6<sup>th</sup> New Zealand Brigade are studied in detail. This report has been structured such that the situations of both sides are discussed, followed by a detailed narrative of the operation. Of particular interest to students of military engineering, is the effect of the lack of antipersonnel mines on the effectiveness of the "Devil's Gardens." Although this was forced on *Generalfeldmarshall* Rommel and his men by logistic constraints, it should be of current interest as our soldiers are stripped of conventional mines by 2010.

This series of case studies is being performed primarily to develop available historical data on actual combat experience into a product that could be used to support the validation and verification of computer modeling and simulation efforts. After all, the battlefield is the ultimate laboratory for studying the military arts and sciences. For this reason, it was necessary to include as much data as possible. It must be remembered that deliberate breaches are tactical combined arms operations, typically done at battalion or brigade level. They have frequently proven to be extremely difficult to study in depth due to a general lack of detailed tactical combined arms histories. While researching the available information, it became apparent that the more popular works of military history, published by American and British authors, were written for general public consumption and were focused primarily on infantry, armor or command level actions. In this sense, they are not rigorous in their coverage of an operation, generally neglecting to discuss or analyze the role of other arms and services. To make matters more difficult in this effort to study of breaching operations, engineer officers, of all nationalities, are notoriously reluctant writers. This is more regrettable since (in the author's experience anyway) in combat engineering, "the devil is truly in the details." Most of the available accounts are either by individual, eyewitness soldiers who fought at the lowest level of combat and frequently lacked any sense of context, or they are the accounts of general officers in command of the battle and painted in broad-brush strokes. There is normally very little in between these two extremes. Nevertheless, much of the leadership in the US Army is assigned to tactical units where the battles are fought and the commanders (and their staffs) are called upon to synchronize, "in real time," their bewildering array of weapons, units and other assets. There are very few military officers involved in strategic, big picture decision-making, however, many are responsible for the "on-the-spot" tactical decisions that directly influence the number of letters home that must be written after the battle is over.

Fortunately, for this paper, the New Zealand government, apparently at the behest of Brigadier General Kippenberger, has prepared a number of superb official histories. For this reason, the author would like to express his immense gratitude to the historians who took the time and effort to write incredibly detailed histories of the

units, including the engineers and artillery, of the 2<sup>nd</sup> New Zealand Division. The author would also like to thank the engineer liaison officers, Lieutenant Colonel Helmuth Bach (Germany), Lieutenant Colonel Lilleyman (the United Kingdom), as well as Colonel Van De Moezel and Major Darren Nauman (Australia), stationed at the US Army Engineer School (Fort Leonard Wood, Missouri). In addition, the author would like to thank Lieutenant Colonel Richard Cassidy and Major Paul Curry of the Royal New Zealand Engineers and representatives of the Italian government for their assistance and permission to extract extensively from their official histories. Although this paper, by its nature, emphasizes the role played by the combat engineers, an effort has been made to include relevant data on all of the key participants. It is hoped that this paper will be of interest to members of the combat arms community in the study of combined arms breaching operations. After all, combined arms breaching is a maneuver responsibility. The combat engineers simply provide the assets to reduce the actual obstacles.

This report makes extensive use of footnotes and endnotes. The footnotes are given as lower case Roman numerals, and are used to document interesting sidelights or contradictions between sources. Endnotes, on the other hand, are given by Arabic numerals and are simply used to document the source(s) of the noted information. The author has elected to use equivalent NATO terminology where this was not cumbersome. However, there is some risk in this, as fine differences in specific meanings may exist. In some cases, the German terms are retained in order to protect the “feel” of the sources. In addition, wherever possible, the names of the participants are used in the narrative. It must never be forgotten that, in the real world where steel flew through the air, this battle was fought by flesh and bone soldiers, on both sides, who went in harm’s way to defend their nations.

Although every effort has been made to ensure the completeness and accuracy of this paper, any errors or omissions are the sole responsibility of the author. Additionally, the views expressed herein are strictly those of the author and do not reflect the position of the Night Vision and Electronic Sensors Directorate (NVESD); the Communications and Electronics Research, Development and Engineering Command; or the United States Army. Readers are encouraged to provide critical comments or additional information to the author ([William.Schneck@us.army.mil](mailto:William.Schneck@us.army.mil)).

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Annex 2. *General Der Kavallerie* Stumme's Instructions, Dated 22 October 1942

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### Appendix D German Assessment Of Italian Infantry

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Annex 2. Detailed Obstacle Plan For The 2<sup>nd</sup> New Zealand Division Zone Of Attack

Annex 3. Explanation Of World War II German Military Symbolology

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Annex 2. Special Orders For Mine And Obstacle Employment From *Oberst* Hecker And His Staff

a) New Method Of Arranging Minefields ("Mine Boxes")

b) Special Order For Mine Employment Nr. 8

c) Special Order For Obstacle Employment Nr. 3

d) Experiences In Mine Employment In The Last Month (by *Hauptmann* Andres, Commander 200<sup>th</sup> Pioneer Battalion)

Annex 3. Chapter IV. "Tactics," Section VII. "Minefields," Extracted From Handbook On German Military Forces, TM-E 30-451, War Department, Washington, D. C., 15 March 1945.

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b) Antipersonnel Mines

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b) Antipersonnel Mines

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*Deutsch-Italienischen Panzerarmee*

*Deutschen Afrika Korps*

XX Italian Motorized Corps

X Italian Corps

XXI Italian Corps

*Panzerarmee* Troops

II *Fliegerkorps*

5<sup>th</sup> *Squadra, Regia Aeronautica*

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X Corps

XIII Corps

XXX Corps

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## 2. STRATEGIC OVERVIEW

### 2.1. AXIS STRATEGIC SITUATION

By the fall of 1942, the German expansion was at its geographic high watermark. However, the Wehrmacht was now badly overextended. It lacked the resources to finish its battered opponents and achieve its strategic objectives. Case Blau (Operation Blue, see Map 1), which had called for German pincers from North Africa and southern Russia to link up in the Middle East in late 1942 and seize control of the desperately needed oilfields, had bogged down. In Russia, the Sixth Army under General von Paulus was stalled at Stalingrad and the offensive by *Generalfeldmarshall* von List's Army Group A in the Caucasus Mountains had reached its limit. In North Africa, *Generalfeldmarshall* Rommel's Panzerarmee Afrika<sup>1</sup> was digging in at El Alamein after its failed attempts to breakthrough to the Suez Canal in the summer. Although *Generalfeldmarshall* Rommel and the famed Afrika Korps plainly had an important role to play in Case Blau, they were still treated by the German High Command as an economy of force sideshow. In fact, their original task had been to assume an operationally defensive posture in order to keep the Italians in the war and the Western Allies occupied. This would permit the vast majority of German combat power to engage in a life or death struggle with the Russian colossus. In addition, at this time, the Battle for the North Atlantic was approaching its unsuccessful climax while the increasing power of the Allied air raids over the Fatherland did not bode well for Germany.

### 2.2. ALLIED STRATEGIC SITUATION

With the Germans distracted in Russia and the Americans assuming primary responsibility for operations against the Japanese in the Pacific, the British were able to focus their limited resources and energy against the Italo-German forces in North Africa. To assist them, the Americans were shipping increasing amounts of material from the US, even though it was less than a year since the Japanese attack on Pearl Harbor. Until American industry and manpower were fully mobilized for all-out war, the British felt that they could not successfully challenge the remaining German strength in Western Europe. Therefore, their strategy was to launch a series of relatively small operations around the periphery of the Third Reich designed to tie down as many German forces as possible. This would relieve some of the enormous pressure on the Soviets until the western Allies could amass sufficient combat power to launch the "Second Front" on the European continent.



MAP 1. Case Blau<sup>1</sup>

<sup>1</sup> Panzerarmee Afrika was redesignated the *Deutch-Italienischen Panzerarmee* effective 1 October 1942. In the interest of simplicity, this new designation will be used throughout this report.

### 3. OPERATIONAL (THEATRE) OVERVIEW

#### 3.1. AXIS OPERATIONAL SITUATION

In February 1941, the German High Command (Ober Kommando der Wehrmacht, OKW) ordered General Rommel and the Deutsches Afrika Korps (DAK), to North Africa. Their mission was to reinforce the battered Italian forces remaining in Libya and prevent a complete Italian collapse. The Italians' precarious situation was a result of their serious defeat at the hands of General Wavell during Operation Compass the previous year. General Rommel was directed to assume an operational defensive and thereby keep the Italians in the war. He was tasked with an "economy of force" mission in a theatre of operation, which the OKW viewed as a "sideshow." However, this posture did not suit the aggressive "Desert Fox." On his own initiative, he attacked the Allies and threw them out of eastern Libya in 1941, except for the garrison at Tobruk (see Map 2). This fortress managed to stall his offensive and produced a stalemate, with both sides racing to build up sufficient combat power to regain the initiative. After two abortive attempts to relieve Tobruk (operations Brevity and Battleaxe), the 8<sup>th</sup> Army finally succeeded in forcing the Axis out of eastern Libya and back to General Rommel's original start line during Operation Crusader in November 1941. However, the Allies lacked the combat power to finish off the Axis forces in North Africa.

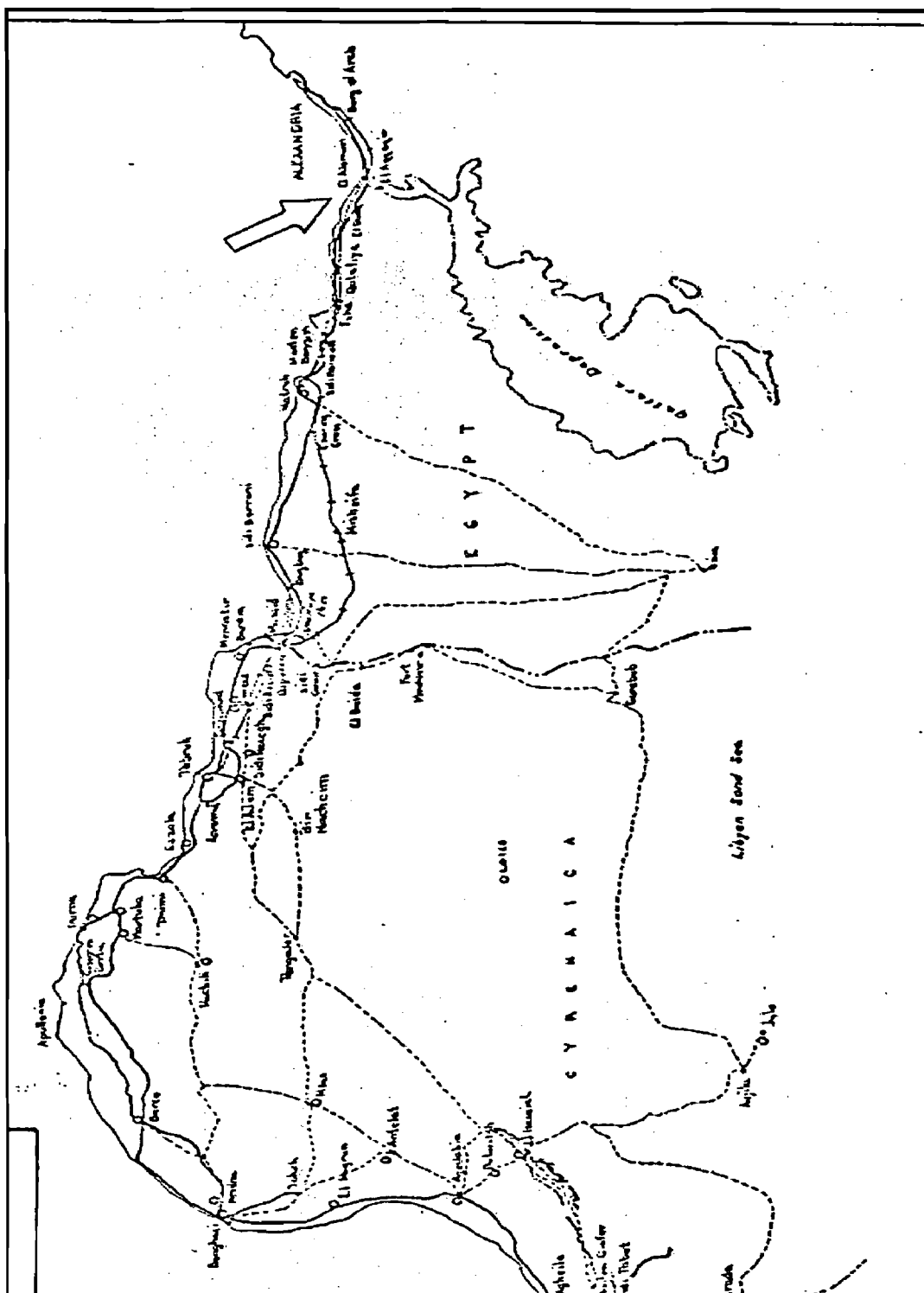
In the spring of 1942, General Rommel attacked again and drove the Allies back to the Gazala line, west of Tobruk. In May 1942, General Rommel resumed the offensive and defeated the numerically superior 8<sup>th</sup> Army in a very closely run fight at the Battle of Gazala (Operation Venezia). After his surprising victory over the Allies and the seizure of the key port of Tobruk, Rommel, now promoted to *Generalfeldmarshall*, decided to gamble. He planned to capture the Suez Canal while his forces held the initiative. *Generalfeldmarshall* Rommel feared this opportunity would pass if the Allies were given time to recover from their defeat at Gazala. Therefore, he requested that Commando Supremo and the OKW cancel Operation Herkules, the plan to capture the island of Malta by airborne assault, and commit those resources to North Africa in support of a thrust towards Suez. This left the British controlled island of Malta, the "unsinkable aircraft carrier," intact athwart the Axis line of supply from Italy. Directed by the invaluable intelligence provided by "Ultra," Allied air attacks from Malta were able to worsen *Generalfeldmarshall* Rommel's critical fuel shortage.<sup>2</sup> Consequently, *Generalfeldmarshall* Rommel was forced to change the direction of his last attack. This caused his final offensive in Egypt to fail among the Allied minefields and RAF attacks at Alam Halfa in early September, only about 100 kilometers west of Alexandria and the Nile River. With the rate of combat power build up and logistics going against him, an ailing *Generalfeldmarshall* Rommel prepared for what he called "the battle without hope," the Second Battle of El Alamein.<sup>1</sup>

#### 3.2. ALLIED OPERATIONAL SITUATION

Despite the setbacks of the spring, General Claude Auchinleck's 8<sup>th</sup> Army was able to stop the initial Axis attacks at El Alamein in July and August 1942. At the end of August, just before the defeat of *Generalfeldmarshall* Rommel's final attack in Egypt at the Battle of Alam Halfa, Winston Churchill directed General Bernard Law Montgomery to replace General Auchinleck because Churchill was dissatisfied with the latter's performance. The decisive point in North Africa had been reached but neither of the two armies was capable of taking the initiative. Consequently, a temporary stalemate settled over the battlefield. The terrain at El Alamein was unusual because it was one of just two places along the North African coast that could not be readily outflanked to the south (the other being at Akarit in Tunisia). The distance between the impassable Qattara Depression and the small village of El Alamein on the Mediterranean Sea was only about 60 kilometers at the narrowest point. In preparing for the Second Battle of El Alamein, General Montgomery understood that the British could not afford to lose another battle. In addition, he must 'set the stage' for the upcoming landings in northwest Africa (Operation Torch, scheduled for early November 1942). This operation was to mark the first major commitment of US ground forces against Germany in World War II. By taking advantage of his logistical superiority and greater rate of combat power build up, General Montgomery intended to mass his forces and achieve a significant superiority in men and material on the eve of his offensive, which he named "Operation Lightfoot."

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<sup>1</sup> *Generalfeldmarshall* Rommel's campaigns in North Africa displayed three of the key military weaknesses that eventually doomed the Wehrmacht and the Third Reich; 1) Unattainable or unsustainable strategic goals, 2) Inadequate intelligence/counterintelligence and, 3) Insufficient logistic support.



MAP 2. North Africa<sup>3</sup>



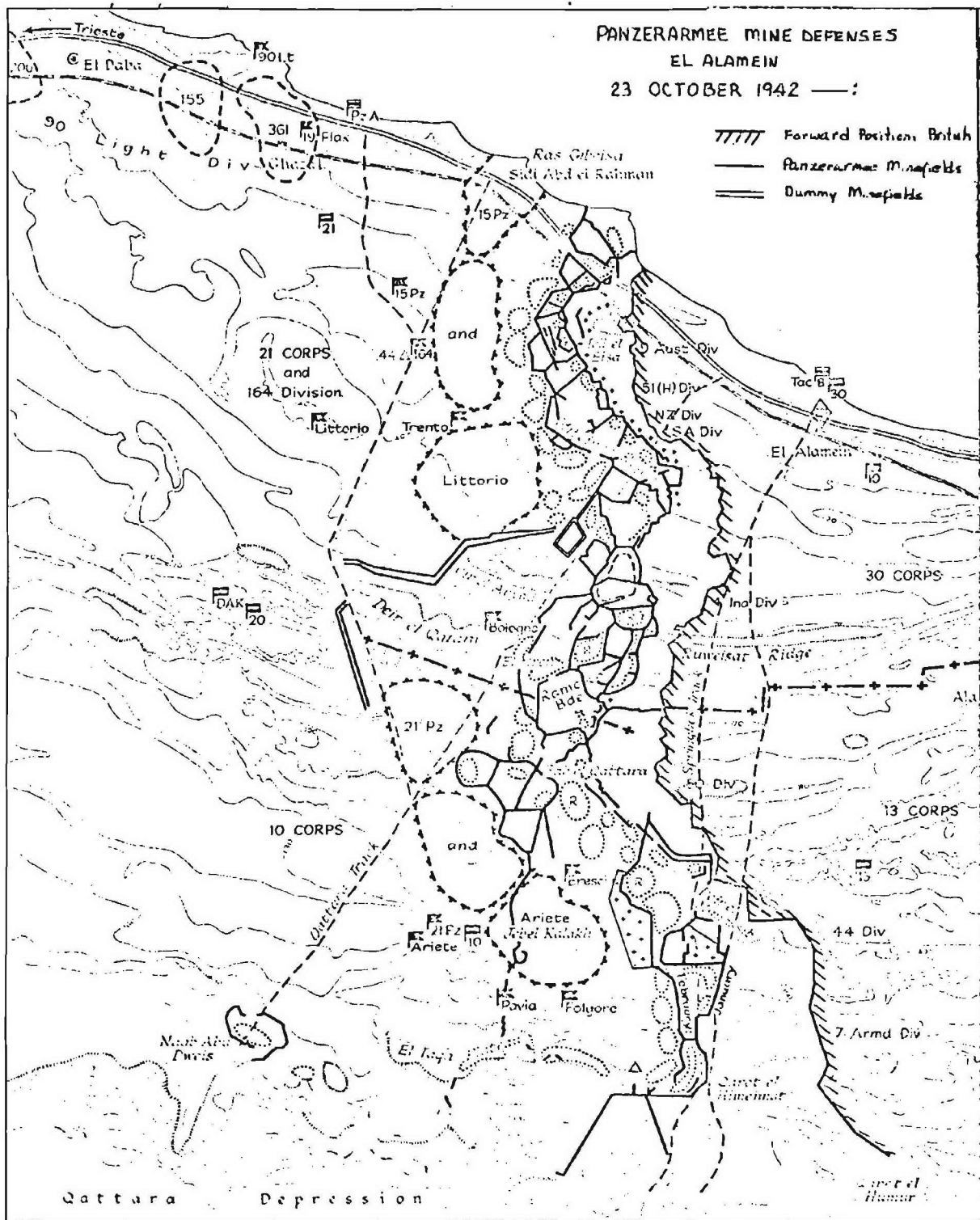
## 4. AXIS TACTICAL PREPARATIONS FOR BATTLE

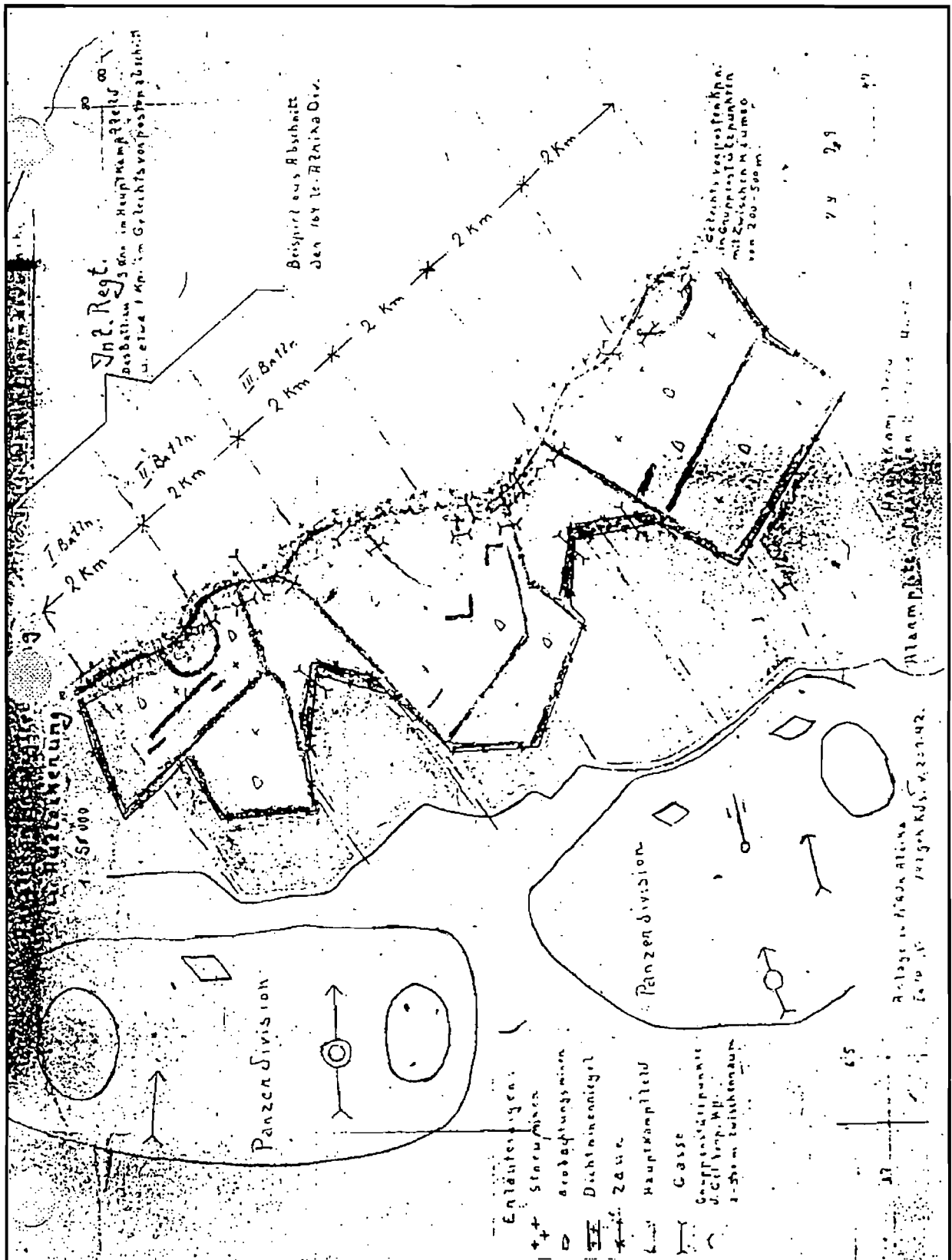
### 4.1. MANEUVER

Up to the fall of 1942, *Generalfeldmarshall* Rommel had gained his fame by the skilful tactical handling of his swiftly maneuvering panzer divisions. Now, he would demonstrate his flexibility by fully exploiting the possibilities of a deliberate defense (as he would again later in organizing the construction of the Atlantic Wall). Indeed, *Generalmajor* Wilhelm Meise, later *Generalfeldmarshall* Rommel's senior staff Engineer in France wrote, "*Quite apart from Rommel's greatness as a soldier, in my view he was the greatest engineer of the Second World War. There was nothing I could teach him. He was my master.*"<sup>4</sup> Considering his logistical situation after his defeat in the Battle of Alam Halfa, the *Generalfeldmarshall* felt that he could not sustain a battle of maneuver. Thus, he was compelled to abandon the mobile warfare tactics at which his German panzer troops excelled. Therefore, he brought forward his relatively immobile infantry formations and prepared for a defensive battle of attrition.<sup>5</sup> *Generalfeldmarshall* Rommel and his officers knew that the 8<sup>th</sup> Army was better equipped to execute a deliberate set piece battle than for open battle in the desert. Indeed, the training of British soldiers was still partly based on their experiences in the trench battles of the First World War. "*This caused us great anxiety,*" said *Oberst* Fritz Bayerlein, the Chief of Staff for the *Deutsches Afrika Korps* (DAK), "*the New Zealand and Australian infantry were also trained for frontal attacks and the superior Allied artillery, with its vast supplies of ammunition, could be very destructive. It was a great headache. For us, it was a question of not allowing our positions to be broken, for the Panzerarmee was no longer in a position to fight a mobile defensive battle. The shortage of fuel and above all, the vast superiority of the RAF ruled this out. Our plan, therefore, was to hold the front at all costs. Any penetrations by the enemy were to be ironed out by immediate counter-attacks so that a salient could not be developed.*"<sup>6</sup>

With the failure of the *panzerarmee* to breakthrough at the Battle of Alam Halfa in early September, the Axis armored units were withdrawn from the front to rest and refit. Most of the infantry dug in where they stood while the pioneers (combat engineers) continued to emplace minefields in the main obstacle belt, incorporating minefields previously laid during the summer, and constructing deliberate defensive positions behind the infantry. Since the Axis defensive positions between the Mediterranean Sea and the Qattara Depression could not be readily outflanked, *Generalfeldmarshall* Rommel knew that General Montgomery's 8<sup>th</sup> Army would have to breach it by frontal assault. In an attempt to minimize the effect of Allied superiority in artillery and air support, *Generalfeldmarshall* Rommel devised a novel defensive system based on a defense in depth. He had seen used similar techniques used by the Germans to good effect against the British and French on the Western Front during the First World War.<sup>7</sup> The main obstacle to the Allied attack would be a continuous line of mine boxes, each sown with thousands of mines and covered by direct and indirect fire. Just behind the front face of this line of mine boxes would be a line of combat outposts. About 1,000 to 2,000 meters behind the front edge of the mine boxes were the main infantry defensive positions. These extended about 2,000 to 3,000 meters in depth. The better antitank guns were to be deployed toward the rear of this main defensive area in centrally controlled groups of two or three. Next, *Generalfeldmarshall* Rommel's veteran armored divisions were stationed about 7 to 12 kilometers behind the front edge of the mine boxes as a mobile counterattack force.<sup>8</sup> Further back along the coast road, *Generalfeldmarshall* Rommel retained a small reserve force consisting of two undermanned motorized infantry divisions (see Map 3, Sketch 1, and Appendix A).

As each sector neared completion, the Axis infantry battalions were to be withdrawn behind the obstacle belt to their main defensive positions with a frontage of about 2 kilometers per battalion, leaving behind a thinly manned line of squad-sized combat outposts. The main line of outposts was protected by the front edge of the mine boxes and additional small observation posts were placed forward of them in 'no-mans' land.' The outposts were also provided with dogs to give warning of any Allied approach. Typically, each infantry battalion provided up to one company, on a rotating basis, for outpost duty. Thus, the companies on outpost duty were assigned to protect the same positions and frontages previously held by their battalions. These positions were sacrificial; the infantry squads unlucky enough to be manning them during a major Allied offensive were expected to hold their ground as long as possible. There would be no withdrawal authorized. In *panzerarmee* slang, the soldiers in these positions were known as "cannon bait."<sup>9</sup> However, *Generalfeldmarshall* Rommel felt that these outposts were necessary to





SKETCH 1. Generalfeldmarshall Rommel's Defensive Plan<sup>11</sup>

counter Allied reconnaissance efforts and to reduce the chance of the 8<sup>th</sup> Army surprising the main defensive line. This defensive configuration was also intended to increase the chances of defeating any breaching attempt or at least making it much more costly and time consuming by engaging the 8<sup>th</sup> Army early in the breach with accurate direct and indirect fire. *Generalfeldmarshall* Rommel wanted to ensure that the work of breaching the minefields precede at the slowest possible speed and not until the outposts had been eliminated (see Appendix A). The outposts were also expected to help identify the 8<sup>th</sup> Army's main effort.<sup>12</sup>

Between the outpost line and the main defensive positions lay the mine boxes. These were called "*minengarten*" or "*teufelsgarten*," literally "Devil's Gardens." In these, densely laid minefields (*dichtminenfeld*) were emplaced in the forward and rear obstacle belts as well as in the lateral "walls." The configuration of the obstacles, as well as that of the infantry battle positions conformed not only to *Generalfeldmarshall* Rommel's concepts for the defense but also to the nature of local terrain features that differed from sector to sector along the line (see Appendix H, Terrain Analysis). The resulting "hollow squares" were intended to serve as traps; any Allied troops that succeeded in penetrating the forward defenses could be brought under flanking (*enfilading*) fire from either or both of the adjacent "wall" areas as well as direct fire from the main defensive positions. In addition, the lateral, "wall," minefields were intended to hinder any turning movements by a force that had penetrated the area. As an additional measure, a number of antitank mines were laid randomly outside the tactical obstacle belts, to further disrupt any breaching operations.<sup>13</sup>

Behind the main defensive line, the pioneers did not have sufficient mines to form a third continuous belt. Therefore, they maintained a reserve of mines that were to be emplaced during the battle. In addition, numerous protective minefields were emplaced around rear area strong points, headquarters, and artillery positions. *Generalfeldmarshall* Rommel's plan called for 30% of the mines to be antipersonnel types. Unfortunately for the Axis, most of the mines available were of the antitank type (only 8% of the mines used were antipersonnel type in the final analysis), which meant that the Allied infantry and sappers could usually walk over the minefields without danger and could clear them with relative ease.<sup>14</sup> However, the fact that neither the German nor the Italian engineers assigned to the *panzerarmee* had heavy construction equipment effectively meant that they could not dig antitank ditches in the hard ground around El Alamein.

By 20 October, the pioneers' work in the "Devil's Gardens" had progressed sufficiently for the forward deployed Axis infantry to withdraw behind the mine boxes and occupy their new positions in the main line of defense.<sup>15</sup> Unfortunately for the *panzerarmee*, the combat effectiveness of some of the Italian infantry divisions was assessed to be unequal to the coming battle. Therefore, *Generalfeldmarshall* Rommel felt compelled to stiffen them with German troops in the northern and central sectors for moral support (see Appendix D for the German assessment of the capabilities of the Italian infantry). This was done by a cumbersome arrangement called "corseting"- interlacing the Italian and German units, such that each Italian infantry battalion always had a German infantry battalion to its left and right.<sup>1</sup> This organization (Sketch 2) significantly complicated the problem of achieving unity of effort but *Generalfeldmarshall* Rommel felt that it was the best way to get the most out of his numerous Italian infantry units.

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<sup>1</sup> General Rommel had done this successfully before at Halfaya Pass in June 1941 and may have been influenced in this idea by his combat experiences in Italy during World War I. There, after the German and Austro-Hungarian governments had established a joint command, a similar procedure had been adopted to stabilize the less reliable Austro-Hungarian units in the area. See *Rommel's North Africa Campaign, September 1940-November 1942*, by Jack Greene and Alessandro Massignani, Combined Books, Conshohocken, Pennsylvania, 1994, page 200.







In the north, the Italian *Trento* and *Bologna* divisions were corseted with the newly arrived German 164<sup>th</sup> *Leicht Afrika* Division as well as two infantry battalions from the German 22<sup>nd</sup> *Fallschirmjager* (Airborne) Brigade. In this sector, the Italian infantry divisions were under the command of General Alessandro Gloria's XXI Italian Corps, while the German 164<sup>th</sup> *Leicht Afrika* Division remained under the command of *General der Panzertruppe* Ritter von Thoma's *Deutsches Afrika Korps*. In the central sector, the Italian *Brescia* Infantry Division, corseted by the other two infantry battalions of the 22<sup>nd</sup> *Fallschirmjager* Brigade, was positioned in the best fortified portion of the front. Further south, the excellent Italian *Folgore* (Airborne) Division, backed up by the Italian *Pavia* Infantry Division covered the remainder of the distance to the Qattara Depression. Based on its previous superb combat performance, it was felt that the Italian paratroopers of the *Folgore* did not require corseting. These three Italian divisions (the *Brescia*, *Folgore*, and *Pavia*) were placed under the command of General Enrico Frattini, the acting commander of the X Italian Corps while 22<sup>nd</sup> *Fallschirmjager* Brigade remained under the command of the *Deutsches Afrika Korps*. The 164<sup>th</sup> *Leicht Afrika* Division, the 22<sup>nd</sup> *Fallschirmjager* Brigade and the *Folgore* Division had all been flown across the Mediterranean Sea without most of their vehicles as emergency reinforcements in the summer, and as a result, they were virtually immobile.<sup>16</sup>

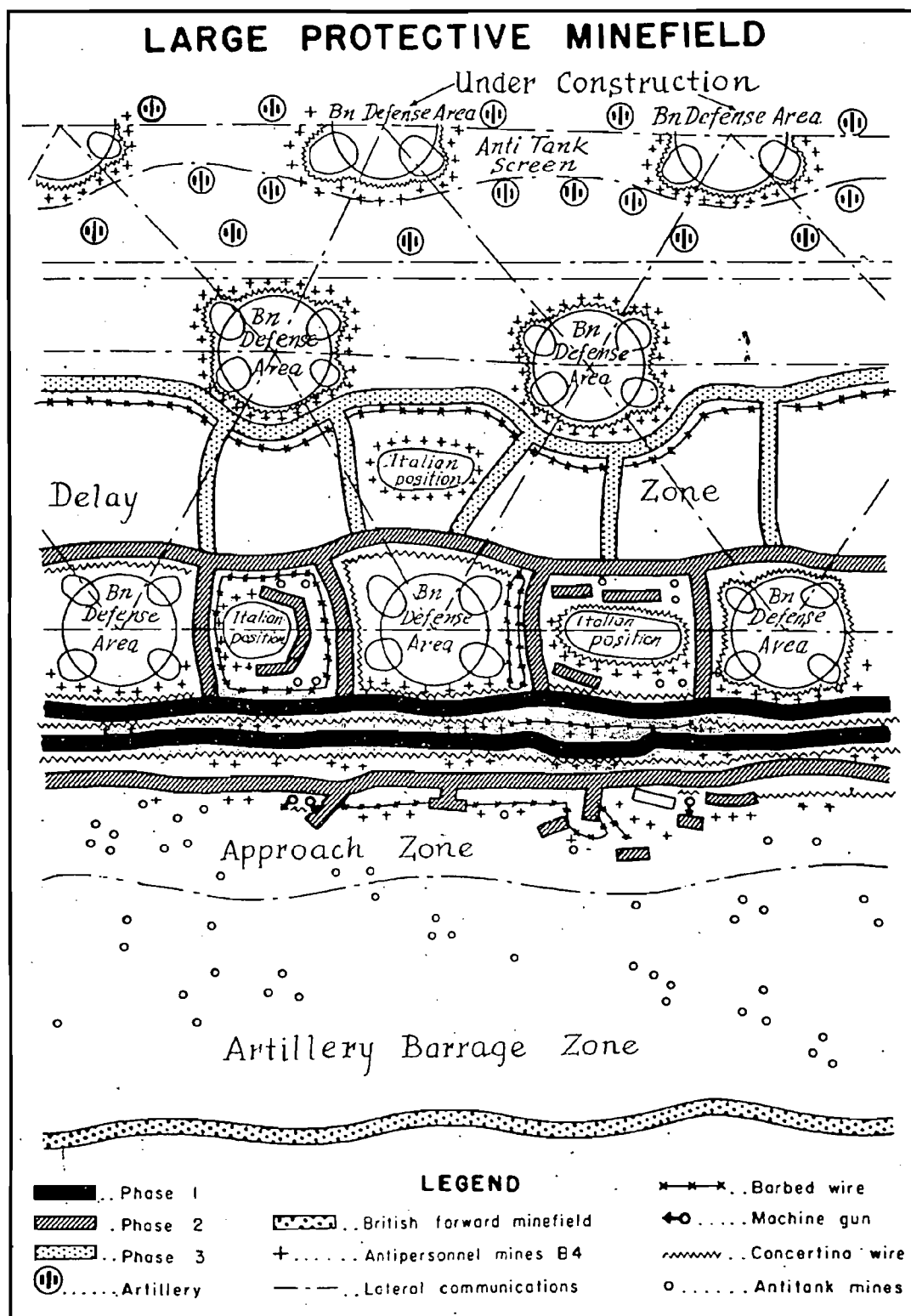
The main defensive positions of the Axis infantry divisions were generally well dug-in and camouflaged, however, only in the central sector was *Generalfeldmarshall* Rommel able to establish a main defensive sector with depth by building a double line of strong points. The German infantry formations of the *panzerarmee* had been modified from the *Wehrmacht*'s basic tables of organization and equipment, which had been designed for European conditions. These formations reflected a philosophy of "few men, many weapons." As a result, they had a disproportionate number of automatic weapons, like the famous MG-34 "Spandau" machine gun, giving them tremendous defensive firepower. However, they were not intended to conduct offensive operations. The primary tank stopping power of the main defensive line was provided by most of the *panzerarmee*'s available antitank guns (see Sketches 3-6 for the doctrinal defensive templates of the Germans). These antitank guns were carefully concealed, and firing smokeless/flashless powder, they had proven to be practically impossible to spot even when they were in action.<sup>17</sup> To protect his infantry from the expected tank attack, *Generalfeldmarshall* Rommel had approximately 650 antitank guns available. Of these, about 400 were German (including 68 of the highly effective captured Russian 7.62cm antitank guns and 290 5cm Pak 38, the rest were primarily obsolescent 3.7cm Pak 36), while the Italians had about 380 of their 47/32 Breda antitank guns (Photo 2).<sup>i</sup> At this point, mention must also be made of the 86 famous 88mm dual-purpose antiaircraft/antitank guns (see Photo 1, at least 36 of these were manned by Italian crews) as well as 8 of the equally lethal Italian-90/53 dual-purpose antiaircraft/antitank guns. However, it must be pointed out that most of the German 88's were manned by *Luftwaffe* personnel from the XIX *Luftwaffe* Flak Division and were primarily deployed in an anti-aircraft role far away from the front. Thus, most of the dreaded 88s were not available for use as antitank guns (see appendices I and J for Axis and Allied Orders of Battle; and tables 12 to 14 for a comparison of Axis and Allied armor and antitank guns). Fifty-two additional 88's were deployed in the deep rear area to provide anti-aircraft protection.<sup>18</sup>

Another unusual facet of the *panzerarmee*'s defensive plan developed through *Generalfeldmarshall* Rommel's response to his critical fuel situation. Since he did not have enough fuel to maneuver large armored formations long distances over the battlefield, *Generalfeldmarshall* Rommel felt that it was best to divide his mobile forces into smaller battle groups. These were to be dispersed behind the main defensive line such that a single battle group could launch an immediate counterattack against any penetrations of his main line of resistance by the 8<sup>th</sup> Army. Such a dilution of his armored strength was contrary to *Generalfeldmarshall* Rommel's (and German) standard practice of massing armor into a decisive, battle winning force. Obviously, this arrangement reduced the number of tanks that would be available for an immediate counterattack. Indeed, the success of these smaller counterattacks would have to depend on speed and shock, rather than mass. The panzers would have to eject the 8<sup>th</sup> Army from any toehold they gained within the main line of resistance before the Allies could consolidate their gains.

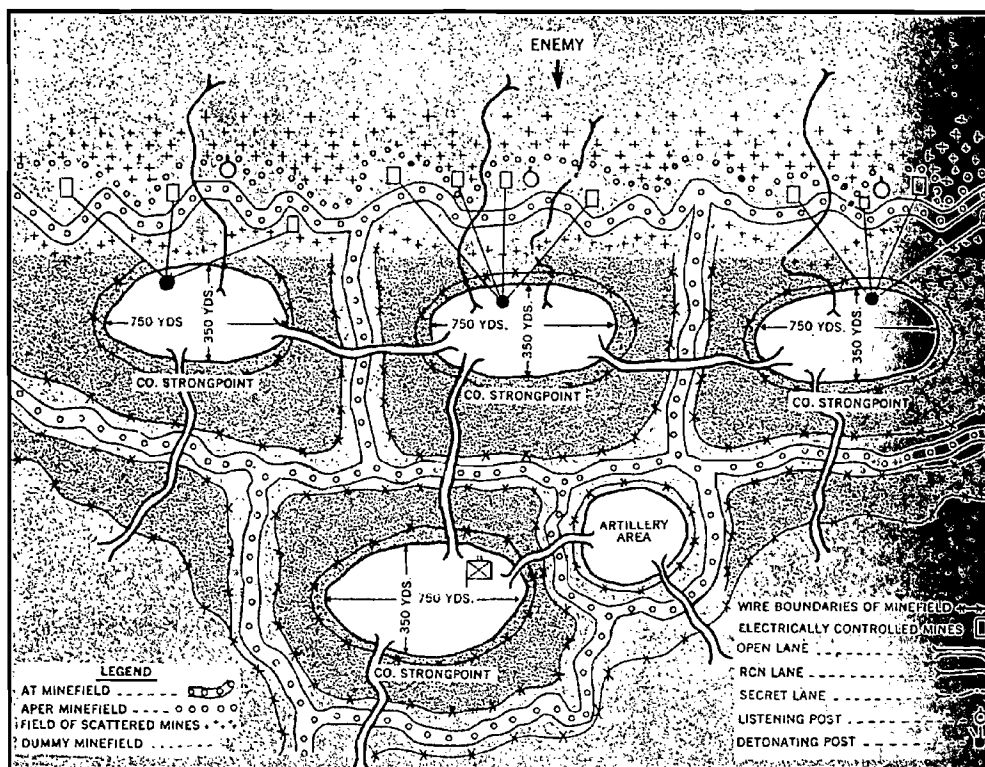
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<sup>i</sup> In Italian weapon nomenclature, the first number is the bore diameter of the weapon in millimeters while the second number gives the length of the barrel in calibers (multiples of the bore diameter). In this case, 47/32 indicates that the weapon has a 47mm bore diameter and that the length of the barrel is 32 times the bore diameter (47mm x 32) or 1.504 meters long. The Italians classified their weapons in the following manner: a weapon with a barrel of less than 12 calibers was classified as a mortar, between 12 and 22 calibers was a howitzer, and above 22 calibers was a gun. See *Handbook on the Italian Military Forces*, TME 30-420, Military Intelligence Service, Washington, D. C., 3 August 1943, page 236.



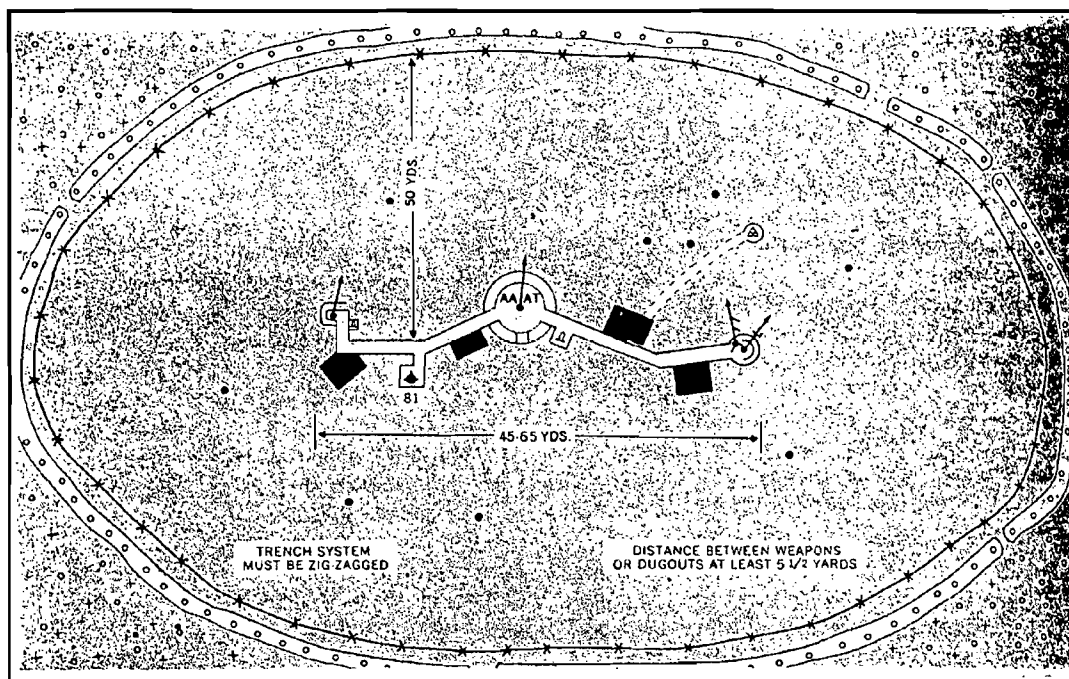


**SKETCH 3. Typical Axis Layout of a Divisional Defense at El Alamein with Italian Infantry Battalions Interspersed**  
 (Note: This sketch does not distinctly show the combat outpost line)<sup>19</sup>



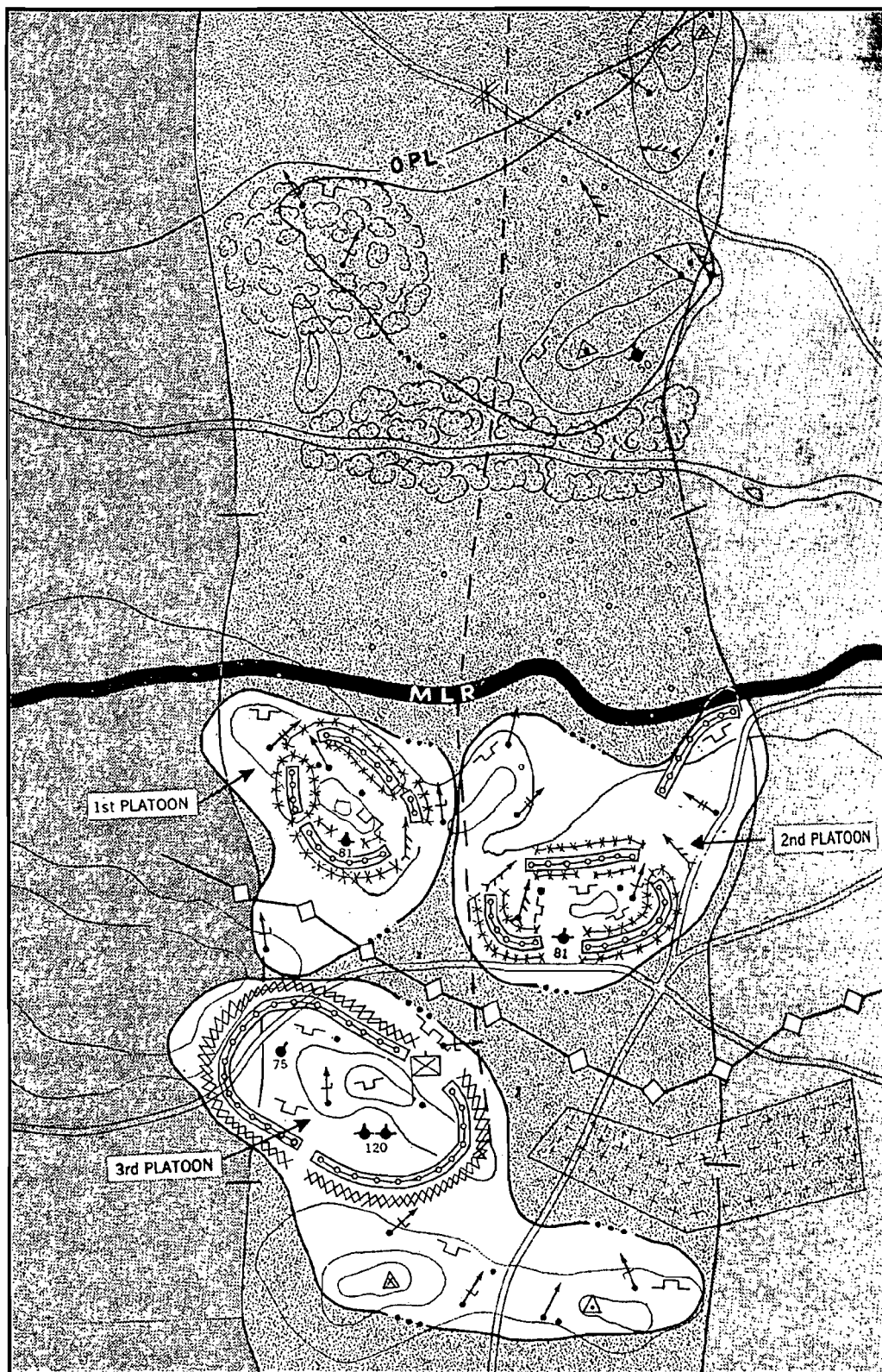
**SKETCH 4. Typical German Layout of a Reinforced Infantry Battalion Strongpoint<sup>20</sup>**

(Note: This sketch shows a four company battalion, the forward Axis battalions at El Alamein had only three companies in their main defensive position. They were probably deployed two up, one back. Regrettably, similar sketches have not been located for the Italian units)



**SKETCH 5. Typical German Layout of a Reinforced Rifle Squad Strongpoint<sup>21</sup>**

(Note: Regrettably, similar sketches have not been located for the Italian units)



**SKETCH 6. Typical German Layout of a Reinforced Rifle Company and Platoons in Defensive Positions**  
 (Note: This sketch is based on mixed, not desert terrain. Regrettably, similar sketches have not been located for the Italian units)<sup>22</sup>

Due to the critical fuel situation, the *panzerarmee* simply could not combine both speed and mass at this time.<sup>23</sup> Behind the northern sector, the counterattack force was composed of the German 15<sup>th</sup> Panzer Division (at approximately 47% authorized manpower and 118 medium tanks) and the Italian *Littorio* Armored Division (at approximately 38% authorized manpower and 116 M14 medium tanks). These were combined into four *kampfgruppen* (battlegroups)<sup>i</sup> and carefully dug-in and positioned to immediately counterattack to eliminate any penetrations of the main defensive area. The German 21<sup>st</sup> Panzer Division (at approximately 33% authorized manpower and 105 medium tanks) and the Italian *Ariete* Armored Division<sup>ii</sup> (at approximately 57% authorized manpower and 129 M14 medium tanks) were also combined into three *kampfgruppen*. These were positioned employed in a similar fashion in the south.

Along the coast road, the depleted German 90<sup>th</sup> *Leicht Afrika* Division and the Italian *Trieste* Motorized Division (nominally under the *Deutsches Afrika Korps* and the Italian XX Motorized Corps, respectively) were held as the reserve of the *Deutsch-Italienischen Panzerarmee*. They were available to counter any Allied amphibious landings along the Egyptian coast or to counterattack/reinforce in the northern sector.

All six mobile divisions were placed under the combined command of the famous *Deutsches Afrika Korps* and the XX Italian Motorized Corps. These two corps headquarters were co-located and were expected to 'cooperate' with one another in coordinating any required counterattacks. In practice, this typically meant that the Germans headquarters did the decision-making with the Italian units concurring and cooperating (but under no obligation to obey) (see Command and Control, section 4.6, for a more detailed discussion of the Axis command and control arrangements).

*Generalfeldmarshall* Rommel's defensive scheme was primarily designed to defeat an armored attack (which he felt was the primary threat), not dismounted infantry. If the 8<sup>th</sup> Army's armor succeeded in breaking through and initiating a mobile battle; the lack of trucks and fuel virtually guaranteed the destruction of the non-motorized infantry portions of the *panzerarmee*.<sup>24</sup> As a result, it was critical to the *panzerarmee* that they be able to correctly identify the main effort of the 8<sup>th</sup> Army early in the coming battle. This would allow the panzers to focus their limited resources at the right time and place.

In preparation to execute *Generalfeldmarshall* Rommel's defensive concept, the *panzerarmee* had scraped together a total of about 500 medium tanks by October 1942. The Germans had less than half of this total, with 223 medium tanks in the two panzer divisions. Of this 223, there were 96 Panzer IIIs, 87 Panzer IIIJs (sometimes called a Panzer III 'Special' with a 60 caliber 5cm main gun, see Photo 3), 10 Panzer IVs (a support tank with a 24 caliber 7.5cm low velocity gun), and 30 Panzer IVf2s (sometimes called a Panzer IV 'Special' with a highly effective 42 caliber 7.5cm high velocity main gun, see Photo 4). The Italians had 279 of the obsolescent M14 medium tanks (see Photo 5) plus 35 *Semovente* armored assault guns (armed with a 75/18 howitzer, see Photo 6). Only 117 of these medium tanks could be considered technically comparable to the 564 new American-built Grants (246 on-hand) and Shermans (318 on-hand) currently being fielded to the 8<sup>th</sup> Army. In addition, the *panzerarmee* had 55 light tanks (33 Panzer IIs and 22 L6s) as well as 42 armored cars (24 German armored cars of mixed type and 18 Italian *Autoblinda* 41s) available for tactical reconnaissance or screening missions.<sup>iii</sup> Lastly, the *Deutsches Afrika Korps* possessed

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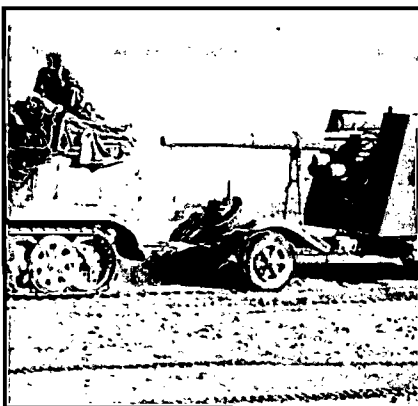
<sup>i</sup> This seems similar to the "corseting" arrangement used with the Italian infantry, however, in this case, it appears to have been done to compensate for the notorious technical shortcomings of the Italian tanks, not the courage of their tankers.

<sup>ii</sup> This was a unit of brave men trying to make do with their notoriously inadequate tanks. *Ariete* was a proud name with a glorious past harking back to the days of the Roman Caesars. Derived from the word *Aries* (Latin for ram), this was the name given, in antiquity, to the massive battering rams that Roman engineers (called *fabri*) used to subdue fortresses and cities throughout the Mediterranean basin. See *Foxes of The Desert, The Story of the Afrika Korps*, by Paul Carell, Schiffer Military History, Atglen, Pennsylvania, 1994, page 232.

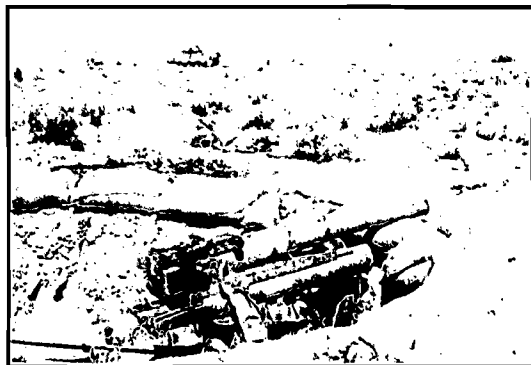
<sup>iii</sup> There is considerable variance between sources on the type and quantity of equipment available to the *panzerarmee*. For example, one source (the official British history titled, *The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV*, by General Playfair, page 30) claims the Axis had 192 armored cars, as opposed to the 42 indicated by the records of the *panzerarmee*. Where available, reports from the units involved are used in this paper.



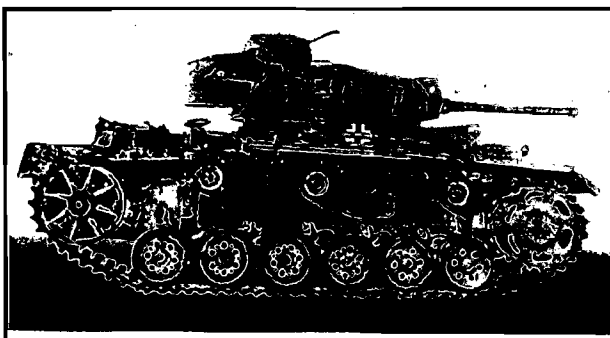
only about 17 of its authorized 81 Sd. Kfz. 250 and 251 half-tracks, thus making it more difficult to execute their counterattacks as true 'combined arms' operations, in the fashion that had proven to be so effective in the past.<sup>1</sup>



**PHOTO 1. 88mm Gun**



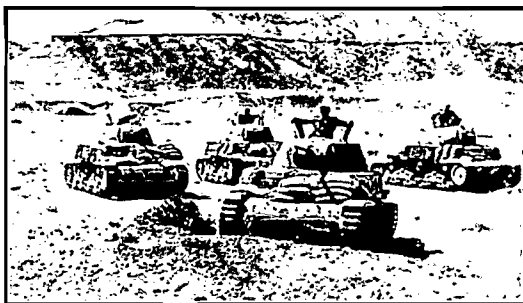
**PHOTO 2. 47/32 Breda Antitank Gun**



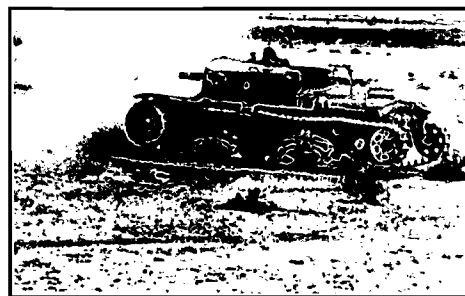
**PHOTO 3. Panzer IIIj "Special"**



**PHOTO 4. Panzer IVf2 "Special"**



**PHOTO 5. M14 "Self-Propelled Coffin"**



**PHOTO 6. Semovente**

<sup>1</sup> General Heinz Guderian, one of the key architects of the vaunted German panzer force, was the first to recognize the absolute necessity of providing armored personnel carriers to the infantry and the pioneers. These half-tracks enabled them to provide the close support required by the panzers, producing the carefully balanced combined arms teams that lay at the basis of the stunning German successes with *Blitzkrieg* early in the war. In the interest of maintaining the striking power of a panzer division, it was found to be advantageous to the division to partially armor both infantry and pioneers, rather than giving all of the carriers to the infantry. See *Achtung-Panzer! The Development of Armoured Forces, Their Tactics and Operational Potential*, by Major-General Heinz Guderian, translated by Christopher Duffy, Arms and Armour Press, London, 1992, page 194. See also *German Panzer Tactics in World War II*, by Charles Sharp, published by George Nafziger, 1998, page 40.

To the Axis infantrymen at the front, every day in September and October was one of monotonous routine. They were filthy, unshaven and caked in layers of gray ashy dust because there was only a limited supply of water. The men lived in holes in the ground surrounded by tangles of barbed wire amid the shell craters and burnt-out tanks of previous battles. Empty tin cans littered the ground in front of the forward positions; the stench of human waste mixed with the heavy sweetish carrion smell of the dead lingered in the nostrils and penetrated the lungs. To add to the misery of the soldiers on both sides, millions of flies joined the combatants at El Alamein- energetic lively ones that were simply a nuisance, and disgusting, sluggish bloated crawlers.<sup>25</sup>

For the future, *Generalfeldmarshall* Rommel planned to defeat the coming Allied offensive and then resume his attack into the Middle East after his troops had been thoroughly provisioned, rested and reinforced. However, as stated earlier, almost two years of campaigning in the western desert had broken *Generalfeldmarshall* Rommel's health. During his sick leave in Germany during September and October, he met with Hitler. Based on these meetings, *Generalfeldmarshall* Rommel told *General der Kavallerie* Stumme, his deputy and acting commander during his absence that, "*The Fuhrer has promised me that he's going to see that the Panzer Army gets every possible reinforcement, and above all the newest and biggest tanks, rocket projectors and antitank guns.*"<sup>26</sup> In addition, many of the preparations, such as the stockpiling of bridging for the Nile River and maps, made for the August offensive that culminated in the attack on Alam Halfa were still in place.<sup>27</sup> Nevertheless, the promises, the frantic preparations and the desperate improvisations did not fool the veteran officers of the *Deutsches Afrika Korps*. General Hans Kramer (former commander of the 15<sup>th</sup> Panzer Division's 8<sup>th</sup> Panzer Regiment and later, the last commander of the *Deutsches Afrika Korps*), for instance, said later: "*Alamein was lost before it was fought. We had not the petrol.*"<sup>28</sup>

#### 4.2. INTELLIGENCE/COUNTERINTELLIGENCE

By the last half of 1942, the Axis forces in North Africa were at a significant disadvantage in both strategic and tactical intelligence. In the days prior to the battle, allied air superiority severely limited the ability of the *Luftwaffe* and the *Regia Aeronautica* to mount effective reconnaissance flights over Allied held territory. What limited reconnaissance was performed was degraded by an extensive and effective Allied deception plan. Furthermore, *Generalfeldmarshall* Rommel had recently lost two of his most valuable intelligence assets in Africa, both involving his signals interception capabilities.<sup>29</sup>

Since early 1942, the Axis had been intercepting and reading classified messages sent from the American Embassy in Cairo. Italian intelligence agents had obtained the "Black Code," a cipher used by the embassy's military attaché, and provided it to the Germans. Colonel Bonner Fellers, the American Military Attaché, was apparently very thorough in his job. He regularly visited Allied troops in the desert, talked to the commanders, and promptly reported the information back to Washington. From his reports, the Germans learned the strength of 8<sup>th</sup> Army units as well as plans for future operations. In July, an Axis prisoner told the Allies that the Germans had broken the American Black Code. The British told the Americans and Washington promptly recalled Colonel Fellers.<sup>30</sup>

The second loss also occurred in July when one of *Generalfeldmarshall* Rommel's most productive intelligence assets was destroyed. This occurred on 10 July when the Italian *Sabatha* Infantry Division broke and ran in the face of an attack by the 9<sup>th</sup> Australian Division. The Australians then overran and wiped out the 621<sup>st</sup> Radio-Intercept Company. This company was described by *Oberstleutnant* Friedrich von Mellenthin (the *panzerarmee*'s Operations Officer from June to 9 September 1942) as "*Rommel's ear placed against the wall of the enemy staff.*" *Oberstleutnant* von Mellenthin stated that the listening company often provided the critical information (collected because of poor Allied radio discipline) that allowed the *Deutsches Afrika Korps* to conduct its bold maneuvers.<sup>31</sup>

To make matters worse for the *panzerarmee*, British Intelligence had cracked the German Enigma code (the Ultra Project) in 1939 with Polish assistance. The Enigma machine was used to encrypt radio traffic between the German high command and its units in the field. The Ultra project enabled the British to read the Enigma transmissions. General Montgomery knew the *panzerarmee*'s entire order of battle, strength, and supply situation. More importantly, it also provided critical intelligence that helped allied naval and air power to strangle the Axis' supply lines by sinking critical supply ships. In their arrogance, the Germans remained completely unaware of the British success in cracking Enigma until after the war.<sup>32</sup> For the most part the Axis did not comprehend the

seriousness of their intelligence situation. Indeed, General Montgomery had so thoroughly deceived the staff of the *panzerarmee* that even the arrival of two new divisions with two hundred and forty guns and a hundred and fifty tanks had passed unnoticed.<sup>33</sup>

### 4.3. MOBILITY, COUNTERMOBILITY AND SURVIVABILITY<sup>34</sup>

#### 4.3.1. THE AXIS ENGINEERS

The Second Battle of El Alamein witnessed the climax of landmine warfare in North Africa. Although the much larger campaigns in both France (1944) and Russia saw greater overall numbers of mines employed, nowhere else did mines reach the density they did at El Alamein.<sup>i</sup> By the fall of 1942, *Generalfeldmarshall* Rommel's pioneers had developed the techniques of mine warfare into a high art. The success of their efforts was a key part of *Generalfeldmarshall* Rommel's plan to defeat the 8<sup>th</sup> Army's next offensive and regain the initiative. In preparation for the battle, approximately 1,300 German pioneers (in 13 pioneer companies) in conjunction with 2,430 Italian engineers (in 16 companies) emplaced over 315,152 mines and 174 kilometers of wire entanglements. Slightly less than half (approximately 138,000) of these mines were emplaced after 2 September, following the failure of *Generalfeldmarshall* Rommel's attack on Alam Halfa.

The senior German pioneer in Africa, *Oberst* (Colonel) Hermann Hans Hecker (Sketch 7)<sup>ii</sup> and his units cannot be excluded from any balanced history of *Generalfeldmarshall* Rommel's famed *Deutsches Afrika Korps*. Although their achievements were critical to many of *Generalfeldmarshall* Rommel's victories in his celebrated North African campaigns, the soldiers of the 33<sup>rd</sup> Panzer Pioneer Battalion (15<sup>th</sup> Panzer Division), 200<sup>th</sup> Panzer Pioneer Battalion (21<sup>st</sup> Panzer Division), 220<sup>th</sup> Pioneer Battalion (164<sup>th</sup> *Leicht Afrika* Division) and 900<sup>th</sup> Pioneer Battalion (90<sup>th</sup> *Leicht Afrika* Division) have remained in the shadow of military recognition.<sup>35</sup> The German pioneers (Photo 7) frequently acted as pathfinders (providing technical reconnaissance), rearguards (obstructing the enemy while the main body withdrew), and trailbreakers during an advance (breaching or clearing obstacles (photos 8 and 9) out in front of the advancing panzers or infantry) and special assault troops (for use against fortifications).<sup>iii</sup> As in many German formations, the pioneers of the *Deutsches Afrika Korps* were often the best assault troops and frequently suffered higher casualty rates than their infantry counterparts, indeed, the German pioneer was a storm trooper first and a technician second.<sup>36</sup>

The Italian engineers, on the other hand, were primarily technical, not combat, troops. Under Italian doctrine, they were intended to construct field fortifications, roads and other facilities, work in the communications zone, emplace and clear obstacles, lay minefields, provide water supply, and supply engineer materials. In addition, signal communications troops were still an integral part of the Italian Corps of Engineers. Their divisional 'mixed' engineer battalions (*battaglione del genio e di collegamenti*) typically contained only a single combat engineer company (three pioneer platoons and one labor platoon) to support the entire division. In addition, the battalion was also responsible for a second company of signal communications troops. However, there were, occasionally, some

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<sup>i</sup> After the battle, British Royal Engineers estimated that both sides had emplaced about 5 million mines along the 60-kilometer front, covering over 1000 square kilometers around El Alamein. The average linear density of mines covering the Axis position at El Alamein was 7,455 antitank mines per kilometer of front. The average linear density of antipersonnel mines (including IEDs) was only about 420 mines per kilometer of front. In comparison, the Russians at Kursk emplaced, on average, about 1,050 antitank mines per kilometer, while on Omaha Beach the Germans had emplaced about 1,300 mines per kilometer by D-Day. However, it should be pointed out that the Russians had emplaced a considerable number of antipersonnel mines (about 1,200 mines per kilometer, with a maximum of 2,447 mines per kilometer on parts of the 7<sup>th</sup> Guards Army sector). This was about three to six times the density the Axis achieved at El Alamein.

<sup>ii</sup> *Oberst* Hecker had served as a pioneer officer in the First World War and began the second as the 29<sup>th</sup> Pioneer Battalion Commander in the 29<sup>th</sup> Infantry Division. He earned the Iron Cross (2<sup>nd</sup> Class) during the Polish Campaign and the Iron Cross (1<sup>st</sup> Class) as well as the Knight's Cross during the French Campaign. He participated in Operation Barbarossa (the invasion of Russia) beginning in June 1941 and temporarily commanded the 71<sup>st</sup> Infantry Regiment. He was promoted to *Oberst* on 1 October 1941 and was assigned to *Panzerarmee Afrika* on 29 October 1941. See his personnel record (microfilm) in the US National Archives, Captured German Records Division, RG (Record Group) 242, German Army Officer 201 File, Roll 248 (un-indexed).

<sup>iii</sup> For examples of their engagements in 1941, see *The Relief of Tobruk*, by W. E. Murphy, The Official History of New Zealand in the Second World War 1939-45, War History Branch, Department of Internal Affairs, Wellington, New Zealand, 1961, Pages 346-347, and *The 9<sup>th</sup> Australian Division Versus the Afrika Corps: An Infantry Division against Tanks-Tobruk, Libya, 1941*, by Ward A. Miller, Combat Studies Institute, US Army Command and General Staff College, Fort Leavenworth, Kansas, 1986, see particularly pages 20-28



specially trained assault engineer battalions (*battaglione guastatori*) available at corps level and higher. These elite units consisted of three assault pioneer units (*reparti d'assalto*), each of which was authorized a wire destruction section, a smoke section, a close-combat section (armed with man-pack flame-throwers<sup>i</sup>) and a light machine gun section. These men were trained at the Assault Engineer School (*Scuola Guastatori del Genio*) at Civitavecchia. This school had been established at the end of March 1940 and organized by an *Oberst* Steiner of the German Army. The *Guastatori* were taught to attack at dawn after using the cover of darkness to conceal their approach. In combat, they were sometimes used against tanks at night. Although not originally trained to lay mines, they were taught to breach them.<sup>37</sup> At least three of the Italian engineer battalions employed during the battles of El Alamein were trained as *Guastatori*, the XXXI Engineer Battalion, XXXII Engineer Battalion, and the VIII Airborne Engineer Battalion. All of these units were assigned to the Italian X Corps in the southern part of the front during Operation Lightfoot (see Appendix I for Axis Order of Battle).

The six months before the final battle of El Alamein had been a very busy period for *Oberst* Hecker and his men. As part of Operation Venezia (the Battle of Gazala) in May, *Oberst* Hecker had been tasked to organize and execute a regimental size amphibious landing behind 8<sup>th</sup> Army lines. However, this part of the operation was cancelled before it could be executed. Later in the battle, after General Rommel's initial attack had failed, the *Deutsches Afrika Korps* was left isolated and nearly out of supplies behind British lines. The British 'mine marshes' that barred the way were initially breached by the Italian sappers of the 28<sup>th</sup> Engineer Company, 52<sup>nd</sup> Engineer Battalion (*Trieste* Motorized Infantry Division) and the 46<sup>th</sup> Engineer Company, 18<sup>th</sup> Engineer Battalion (*Pavia* Division) on 28 May. Eventually, these breaches were secured and used to re-supply General Rommel, thus saving the *Deutsches Afrika Korps*.<sup>38</sup> Later in the battle, General Rommel was forced to form his three available German divisional pioneer battalions, the 33<sup>rd</sup>, 200<sup>th</sup>, and 900<sup>th</sup> into a task force, which was assigned the mission of taking Bir Hacheim from the Free French Brigade. This task force, called *Kampfgruppe* Bir Hacheim, was placed under the command of *Oberst* Hecker.<sup>ii</sup> This elite *kampfgruppe* was employed as special shock troops (called "*Sturmpioniere*" or assault engineers) on 10 June, when they led the assault against the Free French Brigade at Bir Hacheim after repeated attacks by the infantry and panzers had failed. Leading from the front, *Oberst* Hecker received a deep head wound when his command vehicle drove over a mine during the assault. This assault seriously compromised the Free French position, forcing them to evacuate the strongpoint during the night.<sup>39</sup> Already a Knight's Cross holder, *Oberst* Hecker was awarded the German Cross in Gold and the silver wound badge for his part in the action.<sup>40</sup> On 19 June, while the panzer pioneers and *Guastatori* of the XXXI Sapper Battalion led the successful assault on Tobruk by breaching the Allies' defensive minefields, Major Kuba's 900<sup>th</sup> Pioneer Battalion bridged the antitank ditch for the panzers with an improvised wooden bridge (Photo 10).<sup>41</sup> Of this action, General Rommel said, "*The exploits of the engineers that day merited particular praise. It is difficult to conceive what it meant to do work of this kind under heavy British fire. Now the way was open and we unleashed the armor.*"<sup>42</sup>

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<sup>i</sup> These were either the Italian Model 35 or Model 40 flame-throwers. The Model 40 was a rather heavy weapon, weighting 27 kilograms. It used pressurized nitrogen and fuel oil, with a maximum range of only about 16.5 meters and a duration of 12 seconds. *Mussolini's Afrika Korps: The Italian Army in North Africa, 1940-1943*, by Rex Tyre, Axis Europa Books, New York, 1999, ISBN 1-891227-14-9, page 114.

<sup>ii</sup> This is not as radical an arrangement as it might first appear to Anglo-American eyes. Many German combat battalions and regiments (panzer, infantry and artillery) had their own organic platoon of pioneers trained from their ranks. The highly respected pioneers of the pioneer battalions (*pioniertruppen*) were sometimes referred to as *schwarze* (black) *pioniere* because of the black piping of their epaulettes, while the others were referred to as unit pioneers (*truppenpioniere*) or infantry pioneers, artillery pioneers, etc. By the end of August, the *truppenpioniere* in theatre had been reduced to about 55% strength (8/61/499 out of 19/125/893 authorized). US National Archives, Captured German Records Division, Series T-313, Roll 431, frame 8,724,481.





**SKETCH 7.** *Generalfeldmarshall  
Rommel's Senior Pioneer, Oberst Hans Hecker*



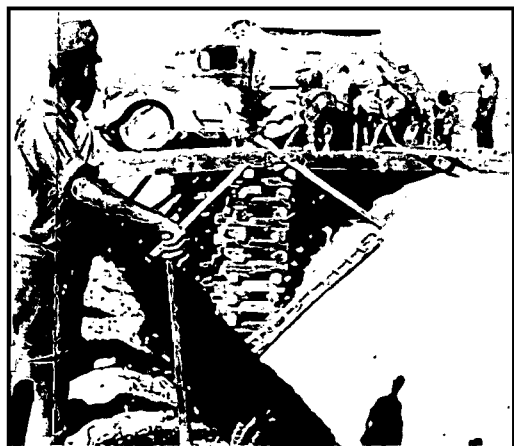
**PHOTO 7:** The Desert Fox's elite assault troops, the young men of the Panzer Pioneers



**PHOTO 8.** Pioneers Sweeping for Mines with the *Neptun* Mine Detector



**PHOTO 9.** Pioneer Preparing to Lift a British Antitank Mine



**PHOTO 10.** Prefabricated Bridge Built by Major Kuba's 900<sup>th</sup> Pioneer Battalion Across Tobruk's Antitank Ditch, 20 June 1942.



**PHOTO 12:** Pioneers Storming the Allied Defenses During the Battle of Alam Halfa, and Opening the Way for the Panzers.



**PHOTO 11. Paolo Caccia-Dominioni de Sillavengo (right),  
Commander of the Italian XXXI *Battaglione Guastatori* at El Alamein (photo taken in 1952)**

On 10 July, the pioneer battalions, reinforced by the newly arrived 3<sup>rd</sup> Company of the 220<sup>th</sup> Pioneer Battalion, were committed as infantry along with the 382<sup>nd</sup> Grenadier Regiment. They reinforced *Generalfeldmarshall* Rommel's line when catastrophe threatened after elements of the Italian *Sabatha* Division broke and ran in the face of a determined attack by the 9<sup>th</sup> Australian Division during the First Battle of El Alamein.<sup>43</sup> After the other two companies of the 220<sup>th</sup> Pioneer Battalion (164<sup>th</sup> *Leicht Afrika* Division) arrived on the northern front later in the month, the battalion relieved the famous 900<sup>th</sup> Pioneer Battalion from the 90<sup>th</sup> *Leicht Afrika* Division. These were Major Kuba's men who had been trained at the Dessau-Rosslar Pioneer School. In August 1942, the Italian XXXII *battaglione guastatori* was almost wiped out at Bir Matqua. As a result, the remnants were absorbed by Major Paolo Caccia-Dominioni de Sillavengo's (Photo 11) Italian XXXI *battaglione guastatori*. During the Battle of Alam Halfa, *Oberst* Hecker's pioneers forced paths through the unexpectedly thick Allied minefields and did their part of their fighting (Photo 12). Indeed, one company from the 900<sup>th</sup> Pioneer Battalion lost 26 killed and about 30 wounded during a powerful Allied night counterattack.<sup>44</sup> As a result of these and other costly actions, the pioneer battalions had lost many of their highly trained specialists (tables 1 and 2). These men proved difficult to replace.<sup>45</sup>

**TABLE 1. GERMAN COMBAT ENGINEER STRENGTH\***

Unit	Higher HQs	Manpower**			Machine Guns		Antitank Guns		Antitank Rifles	
		Auth.***	Assigned	%	Auth	Assigned	Auth	Assigned	Auth.	Assigned
33. Pi Bn	15 Pz Div	22/834	9/201	25	54	27	18X5cm	2X3.7cm	9	1
200 Pi Bn	21 Pz Div	22/834	8/389	58	54		18X5cm		9	
220 Pi Bn	164 <sup>th</sup> Lt Div	21/637	11/315	50	37		9X5cm		9	
900 Pi Bn	90 <sup>th</sup> Lt Div	17/545	10/379	69	36		2X3.7cm		3	
2 Pi Co/ 11 Abn Pi Bn	Ramcke Bde									

\*See Appendix I

\*\*X/Y indicates the breakout of officer and enlisted, for example, the 33<sup>rd</sup> Pioneer Battalion was authorized 22 officers and 834 enlisted men

\*\*\* Auth=Authorized

**TABLE 2. ITALIAN COMBAT ENGINEER STRENGTH\***

Unit	Higher HQs	Manpower**		
		Authorized	Assigned	Percent
24 <sup>th</sup> En Bn	XX Corps			
32 <sup>nd</sup> En Bn	Ariete Div	16/465	10/236	51
33 <sup>rd</sup> En Bn	Littorio Div	16/465		
52 <sup>nd</sup> En Bn	Trieste Div	522	13/305	61
15 <sup>th</sup> En Co.	X Corps		3/129	
31 <sup>st</sup> En Bn	X Corps		610	
46 <sup>th</sup> En Co.	Pavia Div		5/83	
26 <sup>th</sup> En Bn	Brescia Div	522	14/343	68
8 <sup>th</sup> Abn En Bn	Folgore Div***	22/237		
185 <sup>th</sup> Abn En Co	Folgore			
25 <sup>th</sup> En Bn	Bologna			
51 <sup>st</sup> En Bn	Trento Div		12/323	

\*See Appendix I

\*\*X/Y indicates the breakout of officer and enlisted, for example, the 32<sup>nd</sup> Engineer Battalion was authorized 16 officers and 465 enlisted men, however, it should be noted that most Italian engineer battalions were 'mixed' with only one company of combat engineers and one of signals

\*\*\*In addition, the VII Airborne Infantry Battalion was trained as engineers (see Mussolini's Afrika Korps: The Italian Army in North Africa, 1940-1943, page 102)

Major Paolo Caccia-Dominioni de Sillavengo, commander of the Italian XXXI *battaglione guastatori*, described the headquarters of the German Pioneers. After a meeting with *Generalfeldmarshall* Rommel on 14 August, he "walked three hundred yards or so along a path through dense bushes of the marshy sebhka to the caravan of Colonel Hecker. He found the Colonel, whom he already knew, with his two assistants, Captain von Bosse and Lieutenant von Berghof. The remainder of the German Engineer Command was housed in a second caravan and two large tents-two second lieutenants, two geologists and a dozen NCOs, draftsmen, typists and orderlies. It was a tight, hard-working little command, wasting few words and less time. Every so often Hecker, who in addition to having high technical qualifications was also a first-rate tank commander, had to hand everything over to the Captain and dash off to stand in for some wounded general at the head of a division.

Sillavengo went over in his mind the corresponding Italian organization for directing the affairs of the engineers: high command, troop command, supply command, two group commands, three corps commands, nine divisional commands-seventeen commands, altogether, with 5 generals, eleven colonels and at least forty lieutenant-colonels and majors. He reflected sadly on these figures as he seated himself at Hecker's table."<sup>46</sup>

During the attack to Alam Halfa, *Oberst* Hecker was again called on by *Generalfeldmarshall* Rommel to play a key roll when he was directed to assume command of the newly arrived 164<sup>th</sup> *Leicht Afrika* Division after their commander, *Oberst* Karl Lungerhausen was sent to command the 21<sup>st</sup> Panzer Division. A mine had killed Generalmajor Georg von Bismarck, the previous commander of the 21st Panzer Division and a relative of the great "Iron Chancellor," on 1 September. *Oberst* Hecker remained in command until *Oberst* Lungerhausen returned to the 164<sup>th</sup> *Leicht Afrika* Division on 20 September.<sup>47</sup>

#### 4.3.2. MINE WARFARE

In preparation for the Second Battle of El Alamein, *Generalfeldmarshall* Rommel once again called on his now badly depleted pioneers. This time, they were to emplace an elaborate maze of mines and wire, in the "Devil's Gardens." On 23 August, *Generalfeldmarshall* Rommel requested an additional 500,000 mines (70% antitank, 30% antipersonnel), 3,000 km of wire obstacle, and 300,000 pickets from Italy.<sup>48</sup> These were to be used to give depth to the approximately 177,000 (mostly captured British) mines that Axis pioneers had previously emplaced in July and August.<sup>49</sup> These early minefields had already been credited with destroying 57 Allied tanks and armored vehicles as well as 52 other vehicles in just 11 days (from 20 to 30 July).<sup>50</sup> Indeed, *Oberst* Hecker was able to report, for the time between 5 July and 20 October 1942 that mines had disabled 115 tanks, 10 armored cars, 5 universal carriers, and 78 other vehicles, for a total of 206 vehicles. During this same period, the *panzerarmee* reported to have knocked out 160 tanks. This meant that the pioneers' mines had accounted for 72% of the total. In one engagement alone, on 1 September, the 40<sup>th</sup> Battalion, Royal Tank Regiment, lost 9 tanks, 4 armored cars, and 5 universal



carriers to mines while supporting an attack by the Australians of the 2/15<sup>th</sup> Infantry Battalion between Mine Boxes I and L against the 382<sup>nd</sup> Grenadier Regiment, 164<sup>th</sup> *Leicht Afrika* Division.<sup>51</sup>

*Generalfeldmarshall* Rommel's defensive plan and his design for the "Devil's Gardens" was apparently influenced by the 8<sup>th</sup> Army's "Brigade Boxes" and massive "Mine Marshes" that had first been employed at the Battle of Gazala. However, his concept was more advanced. The "Devil's Gardens" were laid out such that the defensive positions were mutually supporting and could cover the obstacles with fire (unlike most of the British 'mine marshes'). In addition, his design provided a deep security zone. These "Devil's Gardens" were an extraordinary achievement with the resources available. Initially, in September before he left for Europe, *Generalfeldmarshall* Rommel gave priority of countermobility support (primarily class V barrier (mines) logistic support) to the southern sector (held by the Italian X Corps) and the lateral minefield between the X and XXI Corps along the Deir el Qatani. It was in the south, initially, that he expected the British main attack. Priority was shifted to the XXI Corps sector in early October because of the distance of X Corps' sector from the *panzerarmee* MSR (Main Supply Route) along the coast road combined with the shortage of transport and petrol. Therefore, *General der Kavalerie* Stumme, during *Generalfeldmarshall* Rommel's absence, was forced to change the task of the X Corps from defeating an Allied attack. Instead, the X Corps was tasked with delaying and weakening any attack, before eventually falling back on the Deir el Qatani minefields.<sup>52</sup> This was a double row of mine panels, running roughly east/west and consisting of more than 23,000 antitank mines, 10,000 of which were laid between 1 and 20 October. Elements of the *Deutsches Afrika Korps* (DAK) had finished emplacing these minefields by 10 October.<sup>53</sup> A second line of defense was considered in the area of the Fuka escarpment to the west, but there were just not enough mines available to emplace it.<sup>54</sup>

When *Leutnant* Gluck, a veteran pioneer, initiated the newly arrived men of *Oberstleutnant* Springorum's 220<sup>th</sup> Pioneer Battalion, he said: "*Here in Africa the pioneer is an important figure. He is probably the most important weapon in Rommel's present armory. That however, does not make it any better to be blown up by a mine!*" Several weeks later *Leutnant* Gluck's name appeared on the casualty report.

Among the new arrivals was *Leutnant* Friedrich Pfanzenagel, a veteran in mine warfare. Nevertheless, he had to start over again, for what had worked well in Poland, France and Greece, where *Leutnant* Pfanzenagel had fought, did not apply well in Africa. Here a new set of rules applied to mine laying. In early September, *Leutnant* Pfanzenagel and his company commander *Leutnant* Junkersdorf, were called to the headquarters of *Oberstleutnant* von Neindorf's the 443<sup>rd</sup> Grenadier Regiment of the 164<sup>th</sup> *Leicht Afrika* Division. Here, *Generalfeldmarshall* Rommel had summoned a commanders' conference where he eagerly propounded his plan for protecting the El Alamein position not only with normal minefields but with huge mine boxes of great defensive strength, his "Devil's Gardens." He had already discussed the matter with their commander, *Oberst* Hecker (acting commander while *Oberst* Lungerhausen commanded the 21<sup>st</sup> Panzer Division), and had worked out the plans with him. After his presentation, *Generalfeldmarshall* Rommel asked, "*What do the pioneers think of the idea?*" *Leutnant* Pfanzenagel and *Leutnant* Junkersdorf replied: "*To lay special minefields should entail no difficulties for the pioneers but where shall we get the material and the mines, Herr General Feldmarschall?*"

"*I'll attend to that,*" replied *Generalfeldmarshall* Rommel and directed a small search unit (*Suchtrupps*) of German pioneers to dig up the abandoned Axis and Allied minefields at Gazala, Tobruk and Mersa Matruh and transport the spoils east.<sup>1</sup> *Oberst* Hecker reported that, "*in order to acquire the mines required, pioneers were sent to both Matruh and Gazala with mine detectors to recover the mines emplaced by the English. This scratch force consisted of the army's pioneer reserve, part of the Pavia Division, the 580<sup>th</sup> Reconnaissance Battalion (from the 90<sup>th</sup> Light Division) and the troops of Deleaze together with a pioneer control element from the German army headquarters staff. In this manner, an additional 44,873 mines were gained in September 1942.*"<sup>55</sup> Soon, supply trucks brought forth load upon load of German, French, British and Egyptian mines as well as barbed wire and pickets as the troops stripped the Egyptian-Libyan frontier of its wire entanglements and steel posts. This belt of frontier obstacles had originally been emplaced by the British to prevent pre-war migration between Libya and Egypt. The line was 271 kilometers in length and had cost 200,000 British pounds to construct. The fence consisted

<sup>1</sup> At the Gazala Line alone, the Allies had laid over 500,000 mines. Apparently, the Axis, who was short of everything, could not efficiently recover all of the old minefields. *Brigadier Frederick Kisch, Soldier and Zionist*, by Norman Bentwich and Michael Kisch, Vallentine, Mitchell & Co., London, 1966, page 148. The statement made in *Rommel's Greatest Victory, The Desert Fox and the Fall of Tobruk, Spring 1942*, by Samuel Mitcham, Presidio Press, Novato, California, 1998, page 35, that more one million mines had been laid could not be substantiated.

of 2-meter long iron pickets (10 cm in diameter) set 30 cm into concrete (30-cm square). Twenty-six kilograms of barbed wire were required for every 4 meters of front. By 1942, this fence was not in good condition.<sup>56</sup> Vast numbers of captured British bombs and shells were also brought forward and built into the defense as improvised mines.<sup>57</sup>

A few days after the conversation between *Generalfeldmarshall* Rommel and the pioneer officers at the headquarters of the 433<sup>rd</sup> Grenadier Regiment, *Oberst* Hecker issued orders to lay the "Devil's Gardens." In mid September, the four German pioneer battalions were detached from their respective divisions and placed directly under *Oberst* Hecker's command for the emplacement of the 'Devil's Gardens.'<sup>58</sup> In the sector of the 164<sup>th</sup> and *Trento* divisions, the pioneers were tasked with building four huge mine boxes that would contain an estimated 110,548 mines by the beginning of the battle to protect the critical northern front.<sup>59</sup> The base of each box was to be between 3 to 5 km long and the sides about 4 to 7 km deep. For the first phase of emplacement, 98,000 Italian mines and about 45,000 British mines (taken from the old minefields as described above) as well as 19,700 improvised mines were supplied. In the second phase, an additional 120,000 mines were emplaced.<sup>60</sup>

#### 4.3.2.1. MINES AND BOOBYTRAPS

*Generalfeldmarshall* Rommel had a particular affection for this war of mines. He stated with some pride that he could spot a mine from ten meters away. Nor was he shy about clearing mines himself as he demonstrated during his advance into Egypt. On 29 June, *Generalfeldmarshall* Rommel's headquarters was moving east from Mersa Matruh when; "*the crash of bursting mines came from beneath the wheels of our leading vehicles. After I and a few others had cleared away the mines the column moved off again.*"<sup>61</sup> The *Generalfeldmarshall* proudly watched the daily progress of his "Devil's Gardens." Whenever *Oberst* Hecker explained special traps to him, *Generalfeldmarshall* Rommel always looked pleased. The *generalfeldmarshall* was mechanically inclined and intensely interested in the pioneers' various booby traps and 'tricks of the trade.' In fact, *Generalfeldmarshall* Rommel liked working with his pioneers and spoke with pride of having been an infantry pioneer in his younger days.<sup>62</sup> His confidence that his "Devil's Gardens" would prove an insurmountable obstacle to the 8<sup>th</sup> Army grew stronger as the work progressed. *Generalfeldmarshall* Rommel had told the pioneers of *Leutnant* Junkersdorf's 2<sup>nd</sup> Company that "*The main thing is that the sappers have to build efficient "Devil's Gardens" through which no Allied soldier can pass and which no mine-sweeping squads can clear.*" *Leutnant* Junkersdorf chuckled and replied, "*Don't worry, sir,*" mentioning a few tricks he had learned with the 220<sup>th</sup> Pioneer Battalion and had used with some success. If, for example, a few telegraph poles were laid with wires down the road, the British scout car drivers would get out removing the obstacle. If the harmless looking wires were attached to a charge of high explosive built into the road that detonated when the wire was moved then not only the men, but the scout car would be blown sky high. Such booby traps made an opponent nervous and unsure of himself. This effect was perhaps more important than the actual losses. *Oberst* Hecker's pioneers thought out new stunts on a daily basis for this infernal psychological war.

Karl, a *gefreiter* (corporal) from one of the pioneer squads, produced some of the most diabolical ideas. During the battle around Mersa Matruh in the summer of 1942, the British had left cunning booby traps in the hotels and officer's quarters. In the toilets, for example, the plug was attached to pull firing devices so that when it was pulled an explosive charge detonated. The Royal Engineers had even built booby traps into the drawers of the furniture. There were many casualties. Among these was Karl's best friend, the battalion commander's orderly. Since then, Karl had been consumed by hatred for the British and had concentrated his ingenuity on these instruments of mutilation. "*You must approach the matter psychologically,*" was his eternal cry. "*Attach a mine to the door handle? That's for kids! The British did it until they got bored. It no longer takes anyone in and does not affect the adversary's morale.*" On the wall of a room, a picture hung crooked, "*a Tommy wouldn't bother at all about a crooked picture,*" Karl declared, "*but it would annoy the British officer who saw it. He would go over to it and put it straight. But that would be his last action on earth. Therefore, attach a fine wire to the picture leading to a charge in the plaster wall, put in at breast height.*"

Most of the individual mines, which the pioneers referred to as the "Devil's Eggs," were antitank types. These were big enough to immobilize a tank by breaking its track (sometimes called a 'mobility kill') or to wreck a truck. Since much more than a man's weight was required to activate an antitank mine, a soldier could usually tread on one without activating it. Nevertheless an antitank mine might occasionally detonate when stepped on if the fuze was faulty, or if it had been combined with an antipersonnel mine to increase its sensitivity (for

psychological effects). Since most of the mines available were of the antitank type, Allied infantry were expected to advance across the minefields at a walking pace, accepting their casualties. Indeed, most minefields encountered thus far during the North African campaign posed little danger to dismounted troops and had been comparatively easy for the sappers of the Royal Engineers to clear.<sup>63</sup> Nevertheless, the Tellermines (photos 13-15) did have two secondary fuze wells for anti-handling devices, to discourage the manual disarming and lifting of mines. By German doctrine, 3% of the antitank mines were supposed to be fitted with an anti-handling device, indeed, one report stated that, at El Alamein, *"the booby-trap technique had not yet reached its high-water mark of devilish ingenuity, but quite a lot of mines were trapped."* Nevertheless, it is unclear from available records what proportion of Axis emplaced mines was so equipped.<sup>i</sup>

The major mine threat to the Allied foot soldiers were from the famous German S-Mine 35 (S. Mi. 35, 'S' stood for *splitter* (fragment), not *schutzen* (rifleman) as is sometimes stated). It was fitted with a three-prong combination pressure/tripwire fuze (S-Mine Fuze 35) that protruded above the mine (see Photo 16). The prongs and surrounding web of trip wires were easy to miss, especially at night. The S-Mine 35 was the first of its type to be produced in the world. When someone stepped on an S-mine, walked into a trip wire connected to one, or was foolish enough to pick up a souvenir connected to one, it activated. When activated, it bounded one to two meters into the air and exploded, scattering about hundreds of high velocity steel spheres in all directions.<sup>ii</sup> In addition to the S-mines and anti-handling devices on many of the antitank mines, Italian "Red Devil" hand grenades were strewn about and linked into the pattern of antitank mines as booby traps. A small quantity of Italian manufactured antipersonnel mines, principally B4s, were also used (see Appendix G for technical data on the mines employed by the Axis at El Alamein).

The Axis also possessed limited quantities of the first scatterable landmines to be used in warfare, these were the Italian 4AR Manzolini 'Thermos Mines' and the German SD-2 'Butterfly' (photos 17-20). These were both cluster munitions that were dropped by aircraft. The SD-2 seems to have made its combat debut during the Polish campaign in 1939.<sup>iii</sup> The 'Thermos mines' first appeared in combat in Egypt during September 1940. During

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<sup>i</sup> Interestingly, the German minefield records found in the US National Archives do not indicate the presence of anti-handling devices nor of any stacked mines. Although German mine warfare doctrine required the annotation of "booby trapped" mines on their minefield records, the panzerarmee records used the mine panel (typically 24 mines) as the smallest unit. American observers with the 8<sup>th</sup> Army reported that *"relatively few booby traps were found in the minefields, and the traps were almost invariably attached to German Tellermines,"* in "Minefield Techniques used by Rommel in North Africa," page 12. This document is extracted from a report (apparently from an issue of Military Reports of the United Nations) found in the rare book room of the US Engineer School Library at Fort Leonard Wood, Missouri. See also Appendix F, German Mine Warfare Doctrine and The History of Landmines, by Mike Croll, Leo Cooper, Great Britain, 1998, page 40.

<sup>ii</sup> One of the official histories from New Zealand described the S-mine thus: *"The enemy contribution to the complexity of the modern battlefield was the "S" (anti-personnel) mine that was scattered among the anti-tank mines. It could be operated by pressure or pull igniters and from the technical point of view was a beautiful piece of precision engineering. The S-mine was really a small mortar five inches in height and four inches in diameter which had a double-walled container holding about 350 (9mm diameter) steel balls and a bursting charge. A delay device exploded this container, according to the nature of the ground, from three to five feet in the air. The range of the shrapnel and case fragments was up to 200 yards and they were lethal up to 100 yards—a very deadly weapon. We too, of course, possessed anti-personnel mines, but they had been seldom used in the desert and were never the equal of the S-mine. It was not until doctors reported the presence of pellets in new wounds that the enemy's use of shrapnel mines became widely known."* New Zealand Engineers, Middle East, by Joseph F. Cody, Official History of New Zealand in the Second World War, War History Branch, Department of Internal Affairs, Wellington New Zealand, 1961, page 364. See also German Mine Warfare Equipment, TM 5-223C, Department of the Army, March 1952, pages 123-126.

<sup>iii</sup> During the period August to September 1942, "many thousands" of 'butterflies' were dropped just in the 2<sup>nd</sup> New Zealand Division area, but caused few casualties. See The Turning Point, With the N. Z. Engineers at El Alamein, pages 181-182. See also German Air Force Operations in Support of the Army, by Paul Deichmann, USAF Historical Study No. 163, Arno Press, New York, 1962, page 43. However, this study is mistaken in one respect, the SD-2 (not the SD-1) was subsequently copied by the Americans as the M 83 and was used as recently as the Vietnam War. See also German Explosive Ordnance (Bombs, Fuzes, Rockets, Land Mines, Grenades, and Igniters), TM 9-1985-2, Departments of the Army and the Air Force, Washington, D.C., March 1953, pages 34-35, 97-98, 100-110. North Africa, 1940-1943, Landmine and Countermine Warfare, Engineer Agency for Resources Inventories, Washington, D. C., June 1972, page 15 (based on Fourth Indian Division, by Stevens, Constable, London, 1955, pages 37-38). For technical data, see Italian and French Explosive Ordnance, TM 9-1985-6, Departments of the Army and the Air Force, Washington, D. C., March 1953, pages 3, 24-25, 59-60). Although these early scatterable mines were contact-fuzed, laid on the surface and hence could be easily avoided, they continued to cause casualties among the unwary. A Corporal Ted Madigan (a New Zealand sapper) and a Major 'Waddy' Wadison, Royal Engineers, disassembled a dud thermos mine in late 1940 and learned how it worked. See New Zealand Engineers, Middle East, page 16. Major Reid of the Royal New Zealand Engineers had a similar experience with the German butterfly mines in the summer of 1942. See The Turning Point, With the N. Z. Engineers at El Alamein, pages 112-113. No information has been found to date that discusses the methods used by the Axis to employ or mark the locations of their scatterable mines (however, maps are extant which show the general areas into which they were dropped). In the German case, it appears, considering the small number available, that the 'doctrine'

the up coming battle, German aircraft would be used to drop SD-2s on the 2<sup>nd</sup> New Zealand Division's artillery at the end of October in an attempt to re-seed some of the minefields breached earlier in the battle.<sup>64</sup>

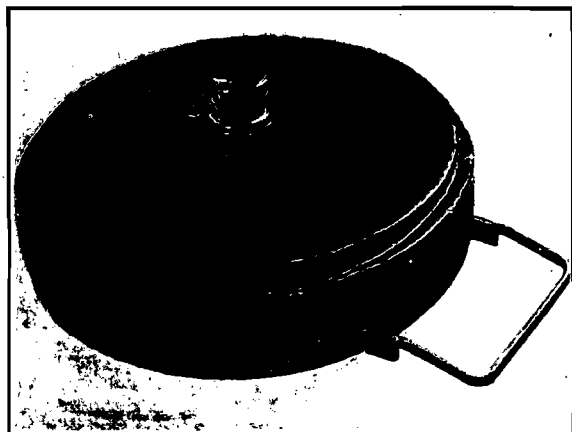


PHOTO 13. Teller mine 35

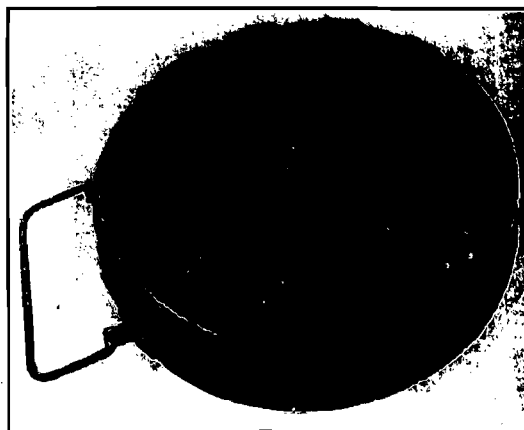


PHOTO 14. Teller mine 35 (Stahl)



PHOTO 15. Teller mine 42, The Smaller Area of its Pressure Plate made it more blast hardened than its predecessors, however, very few were emplaced at El Alamein

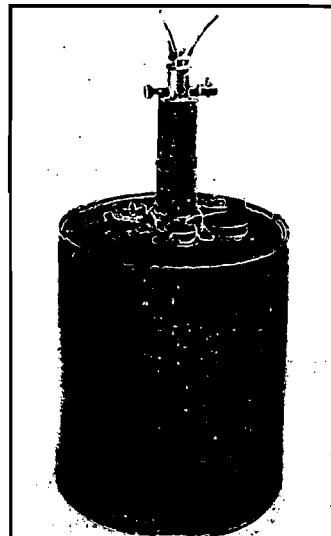
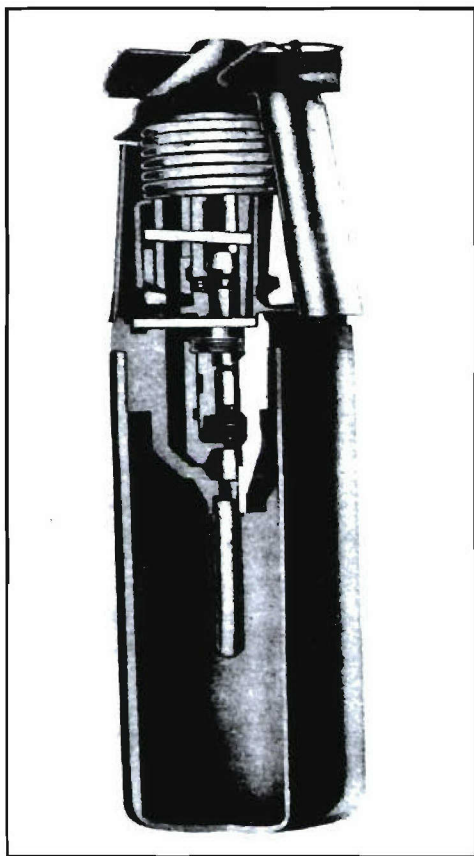


PHOTO 16. S-Mine with S.Mi.Z. 35 Fuze

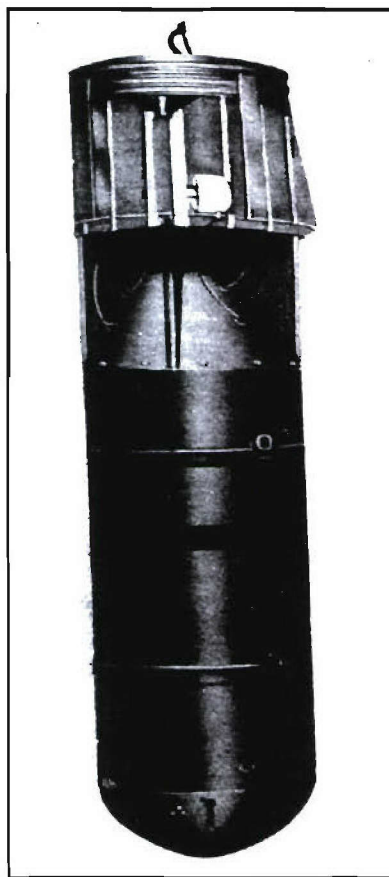
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for their use was left to the discretion of either the senior ground commander or his air force staff officer. In North Africa, at least, the Axis' scatterable mines do not appear to have been well integrated with any of the ground tactical operations.





**PHOTO 17. Italian 4AR Manzolini "Thermos" Mine, an Early Air Scattered Mine**



**PHOTO 18. One of the Cluster Bomb Containers used to Dispense the Thermos Mine**

Due to their desperate logistic situation, the pioneers had to make do with the limited Axis mine stocks that were on hand in North Africa plus whatever could be scavenged or improvised. The Axis used mines of German, Italian, French, British (photos 23 and 25), Egyptian and Hungarian origin.<sup>i</sup> Indeed, only 26,146 German manufactured mines were reportedly emplaced in August and September (8,070 and 18,076 respectively).<sup>ii</sup> However, during their earlier victories in 1942, the *panzerarmee* had captured a large quantity of mine stocks, particularly of the 'Egyptian Pattern' E. P. Mk II and Mk V. As a result, for the period from 5 July to 20 October, the *panzerarmee* emplaced about 180,000 captured or recovered mines of allied manufacture. The 'Egyptian Pattern' antitank mines were manufactured for the 8<sup>th</sup> Army by local labor. They were filled with 5 pounds (a little over 2 kilograms) of 'gelignite' (nitroglycerine-based dynamite) and were particularly dangerous after exposure to excessive heat. The standard procedure in the 8<sup>th</sup> Army called for these hazardous mines to always be blown in place.<sup>iii</sup> The Italians had also begun to improvise the manufacture of their own antitank and antipersonnel mines in

<sup>i</sup> At least 34,376 of the mines laid by Axis engineers in July were of British manufacture. This does not include the 181,000 British mines in the mincfields captured by the Axis during the Battle of Alam Halfa. National Archives, Captured German Records Division, Series T-313, Roll 432, Frames 8,724.841 to 8,724.853.

<sup>ii</sup> Indeed, at the start of the Axis offensive in May, *Oberst* Hecker reported having only 66,845 German mines (40,648 Tellermines and 26,197 S-mines) in inventory. See *Deutsch-Italienischen Panzerarmee Kriegstagebuch*, anlage 201. See also US National Archives, Captured German Records Division, Series T-313, Roll 430, Frame 8,722,726 and "Minenkampf im Afrikafeldzug," pages 2 and 3.

<sup>iii</sup> Indeed, a British document on the "A. TK. E. P. MK. II MINE" captured by the Germans stated "(1) The mine is badly constructed, and is dangerous to handle. (2) There appears to be evidence indicating possible sabotage or sheer carelessness in the assembling of these mines. It is therefore necessary to conduct a 100% inspection before the mines are issued to the laying party. If there is the slightest doubt the mine must be



Tripoli. These wooden-cased mines used about 9 pounds (about 4 kilograms) of captured British wet guncotton (nitrocellulose) and were made with the minimum amount of metal components and were designed to counter British advances in electronic mine detection. Fortunately for the Allies, these were only available in very small quantities prior to the Second Battle of El Alamein.<sup>1</sup> Another major problem for the Axis was that only eight percent of the mines emplaced were antipersonnel types such as the deadly S-mine. *Generalfeldmarshall* Rommel had wanted a mix of one antipersonnel mine for every two antitank mines emplaced.<sup>65</sup> Some relief was achieved by supplementing the available mine stocks with IEDs (Improvised Explosive Devices) such as booby-trapped shells and aerial bombs captured from the Allies. The aerial bombs were connected by trip wires, hooked up to pull igniters, or rigged for command-detonation. These trip wires were laid like a spider's web, and the slightest touch could detonate the bomb. Upon detonation, these 50 and 250 pound bombs could wipe out most of a section or platoon as happened to the New Zealanders of No.3 Section, 8<sup>th</sup> Engineer Field Company supporting the 6<sup>th</sup> New Zealand Brigade,<sup>66</sup> the Australians of 2/24<sup>th</sup> Infantry of the 26<sup>th</sup> Brigade,<sup>67</sup> and the 7<sup>th</sup> Battalion, Black Watch Regiment (51<sup>st</sup> Highland Division).<sup>68</sup> The Axis logistics situation affected even the mines themselves, with a lack of trip wire forcing the Germans to use cotton string as a substitute on some S-mines. In the hostile desert environment, the string soon dry rotted, leaving the mines ineffective, as happened in the 1<sup>st</sup> South African Division's sector.<sup>69</sup>

The hardened combat veterans of the infantry and panzer troops could only gaze in amazement at the achievements of the pioneers and the way they had busied themselves, banging and digging in constant proximity to death (photos 21-25). Bundles of grenades and captured artillery shells were equipped with detonators and bound together with small blocks of explosive. Harmless looking wooden poles were attached to large, well-camouflaged explosive charges such that a tank that drove over one of these poles would activate the charge and be destroyed.

Besides their logistics difficulties, another problem the Axis faced was with the early-model German Tellermine (T. Mi. 35), which was one of the more common types. Due to their large diameter pressure plate, these were particularly vulnerable to sympathetic detonation if laid too close to one another and to overpressure attacks from bombing or artillery. German experience had shown that a 92 meter long gap, 18 to 23 meters wide through a minefield required six hundred 10.5cm HE (High Explosive) rounds with percussion fuze or nine hundred 50kg bombs to breach a gap 46 to 92 meters wide and 183 meters long.<sup>ii</sup> Although these deficiencies were corrected in later models (such as the Tellermine 42 & 43), very few of these newer types were available for the "Devil's Gardens" at El Alamein. Many of the IEDs emplaced by the pioneers were also vulnerable to blast overpressure.

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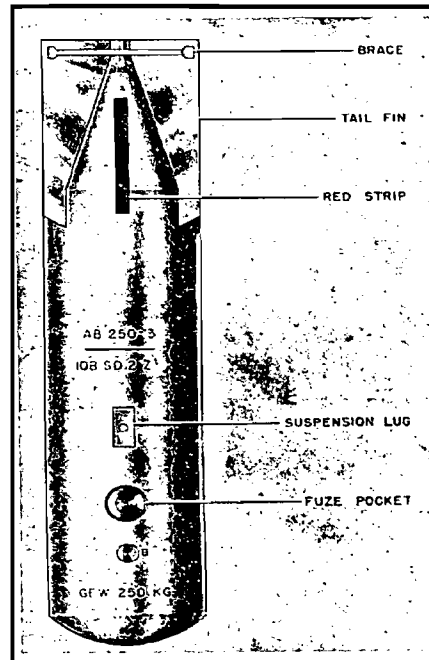
rejected. Failure to do this has already caused casualties." US National Archives, Captured German Records Division, Series T-313, Roll 479, Frame 30. See also Appendix F, Annex 2.

<sup>i</sup> *The Turning Point, With the N. Z. Engineers at El Alamein*, pages 101, 102 and 194, identifies the presence of the wooden antitank mine, however, Lieutenant-Colonel Reid incorrectly attributes this mine to the Germans. See also *Italian and French Explosive Ordnance*, TM 9-1985-6, pages 168-169 or *British, French And Italian Mine Warfare Equipment*, TM 5-223D, Department of the Army, Washington, D. C., May 1952, pages 114-117.

<sup>ii</sup> For example, during Operation Crusader in November 1941, a German minefield containing 900 Tellermines was destroyed by sympathetic detonation. *North Africa, 1940-1943, Landmine and Countermine Warfare*, pages 49 & 261.



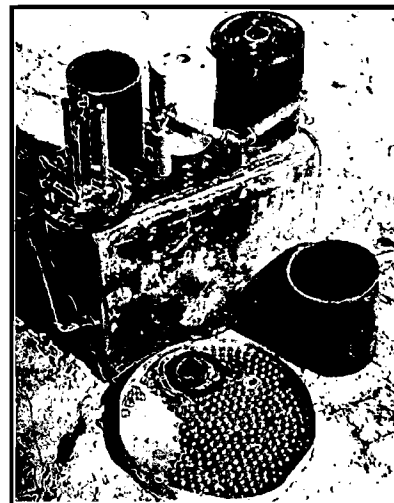
**PHOTO 19. SD-2 "Butterfly" Bomb, Another Early Air Scattered Mine**



**PHOTO 20. The AB250-3 Cluster Bomb Container used to Dispense 108 SD-2 "Butterfly" Mines**

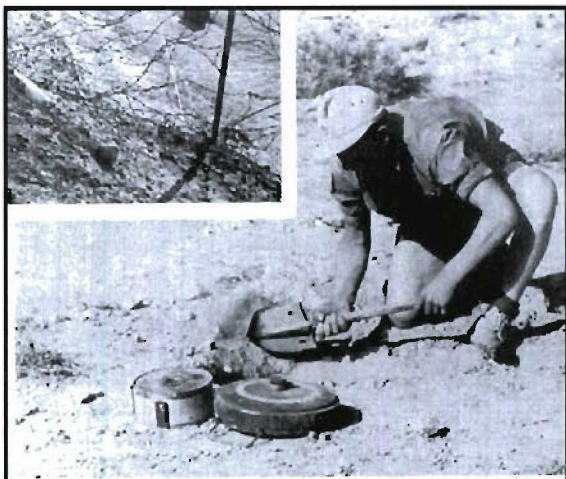


**PHOTO 21. Pioneers Preparing S-Mines for Planting in the "Devil's Garden"**



**PHOTO 22. A Look Inside the S-Mine**





**PHOTO 23. A Pioneer Emplacing a Tellermine 35 British and a Mk V, Possibly as a Booster or as a Trap**



**PHOTO 24. A Pioneer Laying a Tellermine 35**

#### 4.3.2.2. MINEFIELD MARKING

Contrary to current US practice, the Germans viewed mines as weapons to inflict casualties on an attacker. Therefore, the front edge of the forward minefields was often left unmarked with the rear edge usually marked by a single strand of barbed wire supported on short stakes or stone cairns (piles of rocks at least 40cm high). Cattle fences (one meter high) or concertina wire, hung with signs showing a skull & cross bones with *Achtung! Minen!* were also used as markers (Photo 26). As *Hauptmann* Andres, the commander of the 200<sup>th</sup> Pioneer Battalion noted, *"The marking of the limits of the friendly and enemy sides with a high wire (cattle) fence is wise, lower fences were easily overlooked and driven over."*<sup>70</sup> Nevertheless, occasionally the near edges were also left unmarked. Most often, the marking was a single row of concertina wire running along the center of the minefield parallel to the rows of mines. In some of the larger minefields, the Germans laid several rows of concertina, more mines, then more concertina along the friendly edge of the minefield.<sup>71</sup> Major Murray, commander of the 8<sup>th</sup> New Zealand Field Company, reported that, *"In very few cases did we find enemy fields fenced. They had their own systems of marking boundaries, and we often had difficulty in locating the fields. On numerous occasions I have found groups of mines with apparently no marking at all, but after they were lifted we always found the boundary marks. Sometimes they consisted of just small heaps of stones, empty petrol tins, wooden stakes, and many items of debris found on a battlefield."*<sup>72</sup> Antitank mines were occasionally laid by the Axis in unmarked strips running out at right angles from the edge of a marked minefield to damage vehicles moving along the field in search of lanes or a bypass (a combination of turn and disrupt obstacles in modern US parlance). Sometimes the wind would strip sand from a few of the mines, revealing the minefield, but without this indication it took the experienced eye of a sapper to detect the beginning of one. However, at night, the problems of detection would be magnified.<sup>73</sup> The Axis minefields were not intended to channelize Allied movement except by restricting movement within a breached lane. In addition to the hundreds of thousands of live mines that were used, Axis engineers also emplaced 50 kilometers of dummy minefields in an attempt to deceive and confuse the Allies (see Appendix E, Axis Obstacle Plan).<sup>1</sup>

#### 4.3.2.3. THE DEVIL'S GARDENS

During the North African campaign, the Germans normally emplaced their antitank and antipersonnel mines in separate minefields. The antitank minefields were usually composed of staggered panels, each 24 meters wide by 24 meters deep with 24 antitank mines laid in four offset rows of six mines each (see Table 3, sketches 8 and 9, as well as Appendix F, German Mine Warfare Doctrine). This gave a density of one antitank mine per meter of front. By varying the spacing and the number of rows, German doctrine allowed densities up to four mines per

<sup>1</sup> For information on the effectiveness of dummy minefields, see "Tin Triangles," by J. M. Lambert, *The Royal Engineers Journal*, volume LXVI, December 1952, pages 328-338.

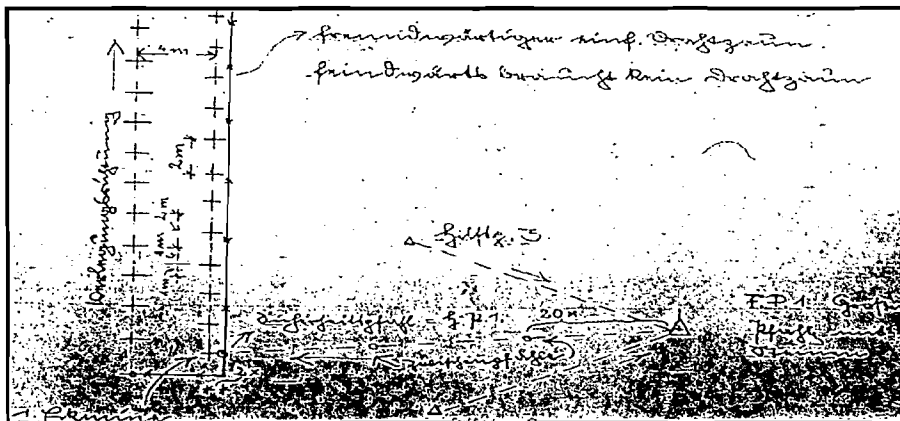
meter of front. S-minefields were laid in much the same way as the Tellermines. One variation, however, was the pull wire minefield, in which three or four S-mines were connected to a single 30-meter long trip wire to increase their effectiveness by activating all of the connected mines at the same time. The density of the S-minefields varied from one to three mines per meter of front. Italian B4 antipersonnel mines were generally emplaced in a single row in front of the forward wire of a minefield, seven to eleven meters apart. Two tripwires (one from each adjacent mine) were then attached to wooden stakes that had been driven into the ground between the mines.<sup>1</sup>



**PHOTO 25. A German Pioneer Arming a Captured British G. S. Mark IV Antitank Mine**

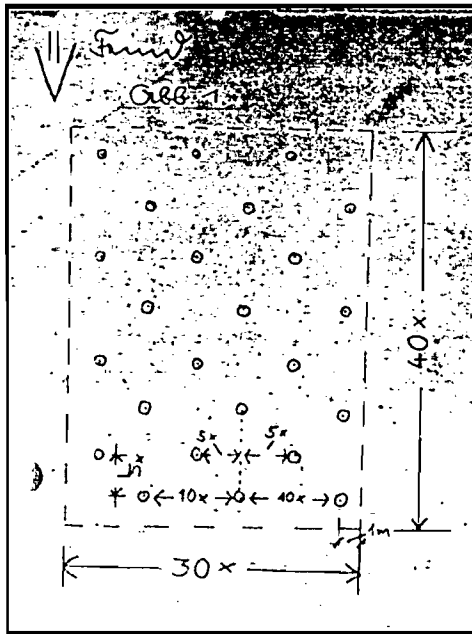


**PHOTO 26. Minefield Marking in a "Devil's Garden"**



**SKETCH 8. German S-Mine Pattern  
(From 200<sup>th</sup> Pioneer Battalion, Annex 2d, Appendix F)**

<sup>1</sup> Handbook on German Military Forces, TM-E 30-451, War Department, Washington, D.C., 15 March 1945, pages 243-252. And North Africa, 1940-1943, Landmine and Countermine Warfare, pages 255-262. For a detailed look at the Allies perception of the *panzerarmee's* mine warfare techniques, see "Minefield Techniques used by Rommel in North Africa," pages 10-18. Specific information on Italian mine warfare doctrine is lacking, however, "the Italians sowed their mines on a regular pattern-about one every five yards in each direction-which the Royal Engineers had learned to recognize..." Alamein, by C. E. Lucas Phillips, White Lion Publishers, London, 1973, page 92. However, see "Campo Minati," N. 17000 di protocollo, Allegati 1, Stato Maggiore R. Esercito, 9 October 1942 for their "philosophy."



**SKETCH 9. German (30 x 40 Pace) Tellermine Panel**  
(From 200<sup>th</sup> Pioneer Battalion, Annex 2d, Appendix F)

**TABLE 3. GERMAN MINE LAYING PARAMETERS**

TYPE	SPACING (meters)	ROWS	DENSITY (mines per meter of front)
Tellermine	4*	2	½
		4	1
		8	2
		12	3
		16	4
	2	2	1
		4	2
		6	3
		8	4
S-Mine	4	4	1
		8	2
		12	3
	2	2	1
		4	2
		6	3

\* Minimum Spacing for surface laid mines

The pioneers emplaced their mine panels in the densely laid, irregularly shaped minefields of the “Devil’s Gardens” (see Sketch 10 for an example). These “Devil’s Gardens” were roughly box shaped and placed between the outpost line and the main defensive positions. Antipersonnel and antitank minefields could be laid one adjacent to the other according to the availability of antipersonnel mines and the tactical situation. As described earlier, the forward and rear main obstacle belts were normally separated by four to six kilometers of desert. However, some portions were up to eight kilometers deep. The main belts were connected by lateral minefields (roughly east-west), which completed the sides of the box (see Map 4 for an example or see Appendix E, Axis Obstacle Plan, for the complete, overall plan). These developed into an overall system configuration conforming not only to *Generalfeldmarshall* Rommel’s concepts of defense but to the demands and advantages of minor local terrain features that differed from sector to sector along the line. Many of the inner minefields were hidden from the alert eyes of the aerial photographic interpreters by emplacing them where the low lying “camel-thorn” scrub was thickest and presented on air photographs a mottled pattern that hid the disturbance of the surface.<sup>74</sup>

The configuration of the *panzerarmee*'s minefield system at El Alamein was designed to increase the chances that the 8<sup>th</sup> Army's breaching efforts would be completely frustrated or at least made much more difficult by an expenditure of mine clearing effort along bands of mines running with the direction of the assault rather than through fields positioned perpendicular to the path of the advance. The 9<sup>th</sup> Royal Australian Engineer Field Company reportedly experienced just such a situation in their advance through the northernmost sector of Rommel's Alamein mine defenses. Apparently in this instance, a number of unnecessary hours were spent lifting mines before Australian engineers discovered that they were moving with the grain of a minefield rather than across it.<sup>75</sup> This also appears to have happened during the 6<sup>th</sup> New Zealand Brigade's attack, although to a lesser extent.

Each "Devil's Garden" was then supposed to be reinforced with various entanglements of barbed wire as well as additional Tellermine laid randomly within and in front of some of the mine boxes in patterns too random for a sapper to easily determine, particularly when time was short. These randomly scattered mines confused the Allies and, in some cases, caused them to begin breaching operations in a thinly mined area. There were 8<sup>th</sup> Army reports that German and Italian patrols were given five mines and told to bury them randomly in no-mans land during their missions. During the course of the battle in the British XIII Corps sector alone, more than 1,000 of these scattered mines were lifted – all were reported to be Tellermine.<sup>i</sup> Antipersonnel mines were not used in this fashion – for obvious reasons. These scattered mines had the effect of causing the British to begin breaching operations once a vehicle struck a mine or a sapper located one. It also caused considerable confusion and delay for the following combat and support units when mines in areas that were presumed safe destroyed their vehicles. These same mine laying tactics were used in the north. They were to cause the premature commitment and resulting early exhaustion of at least the 7<sup>th</sup> Armoured Division's (Desert Rats) limited number of "Scorpion" mine-clearing flail tanks.<sup>76</sup>

The Pioneers also devised some advanced mine-laying techniques in order to enhance the effectiveness of the mine boxes. For example, they occasionally laid Tellermine or 'Egyptian Pattern' mines stacked in several tiers and sometimes connected to each other by pull firing devices along the leading edge of some of the mine boxes. A sweep might reveal the first mine, but a sapper carelessly lifting it might miss or detonate the one below it. An experienced sapper might detect the second one while carefully lifting the first, but then the third one might be missed or prove fatal if the second mine was not carefully checked.<sup>ii</sup> In places, some of the scarce "S" mines were emplaced along the leading edge in an attempt to separate the dismounted sappers and infantry from the tanks. Frequently toward the back (Axis side) of the mine boxes, the IEDs (based on captured British aircraft bombs) were placed in a checkerboard pattern on 10-meter centers<sup>77</sup> and concealed by battlefield debris (see Appendix E, Axis Obstacle Plan). Nevertheless, it frequently proved difficult to dig large enough holes in the rocky ground to accommodate stacked antitank mines or the aircraft bombs used in the IEDs. Not surprisingly, these bombs were not armed as they were emplaced. *Generalfeldmarshall* Rommel had withheld the order to activate these dangerous items within his Devil's Gardens. This was essential because at the outset the main defensive line lay to the east with its back toward these boxes.

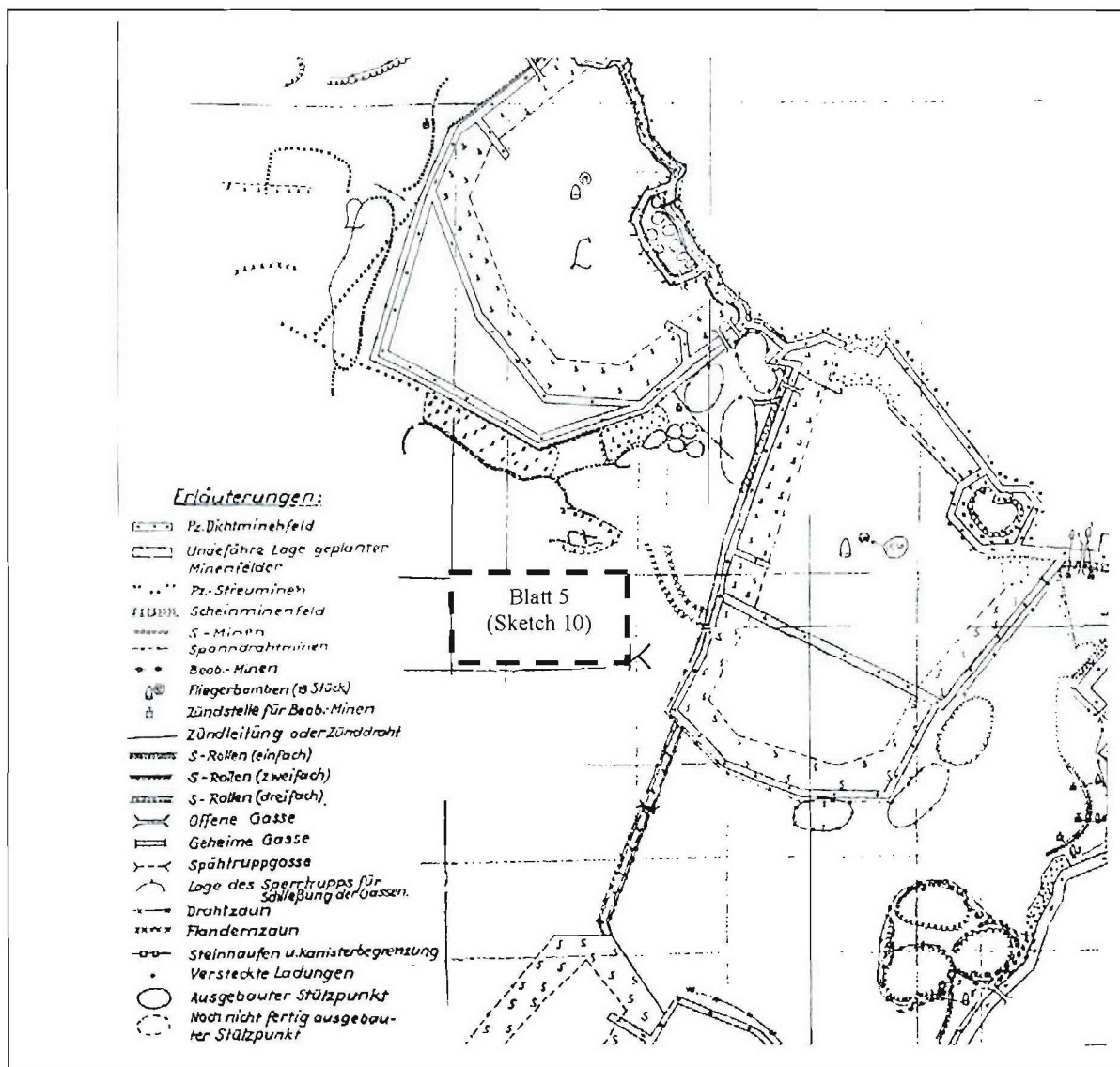
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<sup>i</sup> Australian sappers lifted 203 randomly laid mines during the last few days before the attack, see *Tobruk and El Alamein*, page 61. *Panzerarmee* records indicate that at least 8,260 (1.7% of the total) were laid in this manner. The actual number was probably significantly higher. US National Archives, Captured German Records Division, Series T-313, Roll 432, Frames 8,724,841 to 8,724,849. These randomly laid mines proved to be rather effective, for example, see *Alamein*, page 183 and "The Assault at Alamein," page 327.

<sup>ii</sup> *The Turning Point, With the N. Z. Engineers at El Alamein*, pages 105-106. Author's note: This seems like an extravagant use of resources considering their relative shortage of mines. See also Appendix F, Annex 2.







**MAP 4. Mine Boxes K and L (As of 24 September 1942)**

Note: Sketch 10 is about 180° out of alignment with this map.

Only after the completion of the “Devil’s Gardens” and the new main defensive positions was the main body of a battalion’s troops withdrawn to the west behind the boxes (even then, most had to leave behind a company to man the line of combat outposts) and the IEDs armed. Other mines such as the French, British and Egyptian antitank mines were often employed in the mine boxes. After the mine boxes themselves were built, the pioneers mined the areas between them with teller and “S” mines. However, *Hauptmann* Andres, commander of the 200<sup>th</sup> Pioneer Battalion emphasized the need for some caution in the use of S-mines. He noted that the installation of S-mines at night and in close proximity to the enemy only appears to be wise if the Germans did not anticipate having to attack through that area at a later time (Appendix F, Annex 2).

The Italian engineers also contributed to the Axis mine laying effort, emplacing about 31% of all the mines laid by the Axis at El Alamein, although not without some friction. As describe by Major Sillavengo, commander of the XXXI *battaglione guastatori*, “During the afternoon two extremely smart German Lieutenants came and asked if they might have a word with the commander of the 31<sup>st</sup>. They were the adjutant and one of the company commanders of the 33<sup>rd</sup> Pioneer Battalion and they brought an invitation from their C.O. Captain Hinrichs. All the



German commanders of the division would be present, as well as the C.O.s of a number of engineer units. Following exercises with mine detectors in the minefields, there would be a lecture. Then would come refreshments (accompanied by the band of the 115<sup>th</sup> Panzergrenadiers) and it was hoped that the party would continue through the evening by the light of the moon—provided the RAF did not come to break things up. So far, the whole proposition seemed decidedly attractive and had been presented with the greatest tact and courtesy. But Germans are noted for their *faux pas*—and in a moment the adjutant made clear that the Major was the only Italian to be invited, was the only senior Italian engineer worthy of the honour by reason of his knowledge of the German language and his social position.

The Major was much put out by this. Surely to accept the invitation would mean showing serious lack of respect for his own senior officers—seven in number, and career officers every man jack of them—who had not been invited? Consequently he considered himself bound to refuse the invitation, pleading a non-existent engagement for that very afternoon at Corps H.Q. He begged the two Germans to tell Captain Hinrichs that the 31<sup>st</sup> would welcome his company at luncheon any day he cared to come. It was sincerely hoped that the two lieutenants would be able to accompany their C.O.

This whole affair came about as a result of something which had arisen nine days previously, when an urgent order from 21st Corps informed the Major that he was to present himself to Captain Hinrichs and put himself and his entire Pioneer Battalion at the disposal of Pi. 33. Half an hour following receipt of this order the Major had clicked his heels before Colonel Gavino Ledda, 21<sup>st</sup> Corps Chief of Staff, and protested that such instructions were completely unacceptable couched in such terms; he had no intention of complying with them and was prepared to take whatever consequences might be laid down in the Regulations for the disobedience of similar orders. It was a question of laying a minefield? Very well—but an Italian officer and gentleman, a trained technician, could not, if he were worthy of his position, agree to become the lackey of a junior officer, even if the latter were a German superman.

The poor Colonel, a good man at heart, was plunged into confusion. He said it was a matter of the utmost urgency, and that Rommel himself had framed the order.

'Impossible! Impossible!' cried the Major. 'This shows the heavy-handed technique of Bayerlein or Westphal. However, the minefield obviously has to be laid. I will invite the German captain over to my place and try to come to some arrangement. If he won't come, my company commanders and I will adopt our emergency drill—and report sick! I'll send a lieutenant to the German with written orders: not to take orders from him, but to come to an agreement about the work to be done jointly.'

The Colonel breathed again. The Major had felt obliged to come to his aid—even if he casually overlooked the fact that the dignity of a unit and its commander (however obscure or illustrious) had at all costs to be upheld.

As was to be expected, the German captain had declined the invitation, 'being without vehicles and having to cope with a widely scattered battalion.' So the emergency plan was put into operation, and Lieutenant De Rita went over to the Germans and discussed arrangements for the laying of the minefields. This was to be in the shape of a boomerang about ten miles long and on average a mile wide and situated between Deir el Abyad and Dar el Beda. According to the Germans, the 31<sup>st</sup> 's share of the work ought to take about a fortnight and be completed around October 5<sup>th</sup>.

While De Rita—a man of very few words—was conducting these negotiations, Major Sillavengo and Captain Amoretti and Santini were lying desperately ill in their tents; and the men were already moving up towards the working area in anticipation of the lieutenant's return. The facts of the situation had not been concealed from the Sappers, and they reacted like thoroughbreds when the whips come out. Of their own accord they asked if they could work a shift-system, day and night, requesting only a slight increase in rations and a small distribution of fresh water. In next to no time the work was going with a swing; the Major and the Captains had miraculously recovered and were going around full of smiles for any Germans they happened to encounter. On the morning of September 25<sup>th</sup>, after four days and four nights, the 31<sup>st</sup> completed their share of the task. The German liaison officer evidently sang the praises of the 31<sup>st</sup> to his superiors, and when Hinrichs passed on the order to withdraw he added his own compliments to the Battalion and the thanks of Pi. 33.

From which it can be seen that even supermen such as the Germans are capable of appreciating the efforts of ordinary mortals—provided the latter resolutely refuse to abase themselves. And this latest invitation, though marred by its lack of tact, was the proof of it.<sup>78</sup>

Of course, these mine boxes had to be covered by fire to be effective. As shown by the British experience with their "Mine Marshes" during the Battle of Gazala, an uncovered minefield is a weak obstacle; in fact, it can give the defenders a false sense of security and opponents can easily sweep it. Thus, companies or sections had to be left behind in the positions formerly occupied by their entire battalion. In addition, antitank gun emplacements

were carefully sited to destroy any tanks or vehicles that were slowed or boxed in by these deadly obstacles. To the rear were the strongly manned lines of the main defenses, ready to deal with those attempting to break through and wipe out those who succeeded (see Appendix A, Annex 1 for *Generalfeldmarshall* Rommel's Defense Plan).

Small lanes known only to the local unit's leaders had to be left in order to maintain liaison with the outpost companies. These gaps in the minefields ranged from 6.5 to 9.5 meters in width. In the event of a major Allied attack, many of these were supposed to be closed by two or three rows of Tellermine. In some gaps, a board was to be buried across the fuzes all of the mines in each row. This would insure that a vehicle driving over the board would detonate all of the mines (in effect, an improvised full-width attack fuze). Alternatively, some lanes were to be closed by a skid-mounted "daisy chain" of mines called "*zugladung*" by the Germans.<sup>79</sup> The mines for closing a lane were cached nearby, ready to be laid. To protect the safe passage lanes through their minefields, other special tricks were sometimes used. *Leutnant* Friedrich Pfanzagl of the 3<sup>rd</sup> Company, 220<sup>th</sup> Pioneer Battalion related, "*We buried iron scrap in the lanes. If one of the Allied mine sweeping squads came, his detector registered and he was bound to think that he was over a mine. One night, we observed the Tommies sweeping a lane for a reconnaissance patrol to slip through the minefield. We let them continue unchallenged. Hardly had the British retired then we crawled in and laid new mines. Naturally, we left the Tommy's markers and the recce group got a nasty surprise!*"

The mine boxes in the critical northern sector of the front were assigned to the newly arrived German 164<sup>th</sup> *Leicht Afrika* Division that was committed to provide "corseting" to the Italian *Trento* Division. Mine Box H was the first (northernmost) of the "Devil's Gardens." It was built in the coastal sector held by the 125<sup>th</sup> Saarland Grenadier Regiment and the 7<sup>th</sup> *Bersaglieri* Regiment. Here, *Leutnant* Drexel of 3<sup>rd</sup> Company, 220<sup>th</sup> Pioneer Battalion gave free rein to his imagination. *Leutnant* Laurenz, with 2<sup>nd</sup> Company, was responsible for the second and third boxes, J (known as '*Genoa*' to the Italians) and L, which were in the sector of the 382<sup>nd</sup> German Grenadier Regiment and the 62<sup>nd</sup> Italian Infantry Regiment. The fourth box K (known as '*Karl*' to the Germans) was built by 1<sup>st</sup> Company in the sector of the 433<sup>rd</sup> German Grenadier Regiment and the 61<sup>st</sup> Italian Infantry Regiment. *Leutnant* Pfanzagl, who later took over command of 2<sup>nd</sup> Company, led one of the platoons that built box L.

West of the main defensive line, as mentioned earlier, the pioneers did not have sufficient mines to form another continuous belt. Therefore, they decided to maintain a reserve of mines and explosives that could be emplaced during the battle. At the beginning of the battle, this reserve held at over 70,000 antitank mines (of which at least 2,450 were Italian B-2s and 46,350 Italian V-3s), over 4,600 antipersonnel mines, and 7,800 kilograms of demolitions. In addition, numerous protective minefields were emplaced around rear area strong points, headquarters, and artillery positions.<sup>80</sup>

When done "by the book," German mine laying practice was a carefully choreographed drill. It required fifty men, each carrying four mines, to line up on a measuring wire. Then, on a given signal, they laid a mine at their feet. Next, the whole line moved forward six paces, turned left, moved another three paces and laid the next mine. The same process was then repeated with the other two mines. Then, the men went back and emplaced the mines (buried/armed/camouflaged). The drill was the same for either antitank or antipersonnel mines. In favorable conditions, an area 300 meters by 18 meters could be mined in about 45 minutes.<sup>81</sup>

This work was carried out in the scorching sun of the late Saharan summer, but that was tolerable. Working at night was much more difficult. Everything had to be organized down to the last detail so that accidents could be reduced to a minimum. Before the work began, a machine gun section was sent ahead to establish local security. Then the vehicles with the mines were brought forward and followed the pioneers into the area to be mined at a walking pace. One squad brought the mines from the light truck, another fuzed them and a third laid each mine after establishing the spacing by either pace or using a mine cord. Finally, another squad buried it and the last man armed it. Lastly, the whole field had to be measured and recorded on a map.<sup>i</sup>

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<sup>i</sup> In order to determine the locations of their minefields in the featureless desert, the Germans converted the Allies' terrain reference system that had been emplaced in the area earlier by the surveyors of the 46<sup>th</sup> South African Field Company. This system consisted of empty fuel drums that were numbered and solidly planted on the tops of many small rises in the area. Frequently, the drums had map coordinates painted on them as well. Colonel Paolo Caccia-Dominioni Sillavengo, commander of the Italian XXXI *battaglione guastatori* noted, "*the Germans worked out a system of their own and introduced the so-called 'AP' numbers. There were about 150 of these running from 400 to 550. These were marked on the Allied drums after which the Germans also put half-a-dozen bullets through the drum just in case the Italians, who were frequently short of containers of all kinds, should be tempted to remove it in the unlikely eventuality of their having an opportunity to lay down a small reserve of*



The emplacement of a thousand mines during one of these night shifts by a single platoon was not unusual. However, it was found that the time required to emplace a minefield was considerably higher in rocky ground. And, despite the experience and training of the pioneers, accidents did happen. The pioneers constantly flirted with death, using the confidence gained by long experience at a dangerous task. Sometimes they became overconfident, with fatal results. In the period from 2 September until 19 October, there were eleven major accidents in the *panzerarmee* involving mines, mainly from walking or driving outside of cleared routes, resulting in 32 killed (including four officers) and 42 wounded. However, many of the casualties were engineers. For example, there was a sergeant in 2<sup>nd</sup> Company, 220<sup>th</sup> Pioneer Battalion, working in mine boxes J and L, who liked scaring the infantry by walking through fields of French antitank mines. They required a load of seven hundred pounds to function. One day, the sergeant marched once more through the French field, but he had forgotten that sensitive German “S” mines had recently been laid among them. He was buried near the White Mosque of Tel el Eisa. Then, on 24 September, 8 engineers from the Italian 52<sup>nd</sup> Engineer Battalion were killed when their truck that was carrying 545 antitank mines exploded for unknown reasons.<sup>1</sup>

*Leutnant* Huntz’s men of the 200<sup>th</sup> Panzer Pioneer Battalion, 21st Panzer Division, devised a particularly interesting “game.” They would creep into an Allied minefield, remove the detonators and then rebury the harmless “eggs.” If the Allies checked their minefield with mine detectors everything would appear to be in order. But imagine the unit’s surprise when a German patrol made a sortie and moved through the minefield without a single explosion taking place.

Of these men, Major Sillavengo, Commander of the XXXI *battaglione guastatori*, wrote, “*I seem to glimpse a Germany very different from the cruel, politically-minded Germany of Hitler. The Germany of the Panzergrenadiers is certainly warlike, but it preserves a basis of humanity, something of that romantic, sentimental, Goethe-like quality which no one can deny is a fundamental characteristic of the country. The Germany of the paratroopers on the other hand is 100 per cent Wagnerian—disquieting, grandiose and full of a sense of impending disaster.*”<sup>82</sup>

Indeed, the most daring mine warfare exploits may have been performed by *Leutnant* Cord Tietjen’s 2<sup>nd</sup> Company of *fallschirmjioniere* (airborne combat engineers), detached from Major Rudolf Witzig’s 11<sup>th</sup> (Korps) *Fallschirmjioniere* Battalion to Ramcke’s brigade.<sup>ii</sup> *Obergefreiter* Gross relates, “*at night, we used to cross the El*

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*water!*” *Alamein, 1933-1962, An Italian Story*, by Paolo Caccia-Dominioni, George Allen & Unwin LTD, London, 1966, pages 90-91. AP numbers are shown on maps 13, and 17 to 19. Alternatively, some of the locations of the minefields (particularly those laid by the Italian X Corps and its *Pavia* and *Brescia* infantry divisions, as well as a few from the *Afrika Korps*) were reported based on just general geographic location or in reference to one of the two German “thrust lines” that were used to provide quick encryption of grid locations. See *Kriegstagebuch, Deutsch-Italienschen Panzerarmee, Anlagen* (Situation Maps), US National Archives, Captured German Records Division, Series T-313, Roll 467, 1<sup>st</sup> frame 8,765,457. See also “Stosslinie,” 21<sup>st</sup> Panzer Division *Kriegstagebuch*, Abt. IA Nr. 461/42, dated 28 August 1942, which provides specific information for the thrust lines activated on 30 August 1942. The *panzerarmee* changed its thrust lines three times during the El Alamein campaign, these were: at 2315 hours 16 July, 1800 hours 30 August, and 1800 hours 16 September (all times based on German standard war time)

<sup>i</sup> Other than random mine laying east of the mine boxes by patrols, there is no specific information on the use of infantry work details to emplace mines, but it seems likely that extensive use would have been made of these. Colonel Lambert, Chief of Royal Engineers, 44<sup>th</sup> Infantry Division stated, “*According to most prisoners (probably Italian infantry in this sector) at this time they spent nearly all their time laying mines.*” See “Engineers at the Battle of Alamein, The Southern Sector” J. M. Lambert, *The Royal Engineers Journal*, volume LXVIII, No. 1, March 1954, page 21. See also *Afrika Korps*, page 143, and Appendix F, Annex 2.

<sup>ii</sup> Major Rudolf Witzig, Knight’s Cross winner for leading the famous reduction of Fort Eben Emael, later commanded the 21<sup>st</sup> *Fallschirmjoniern* (Airborne Combat Engineer) Battalion in Tunisia. Here, his pioneers conducted many daring raids. In early 1943, “*on one mission, armed only with hand-grenades and Teller mines, the Para (Parachute) Engineers moved swiftly through the night to strike a British laager. A small section of paras passed the sentries and placed mines in the tank tracks. The main body of commandos then withdrew leaving a couple of paras standing on the rear deck of two of the Churchills. As the German squad melted into the darkness the intrepid pair dropped satchels of explosives into the open turrets. The Churchills brewed up. The tank crews, brutally awakened, rushed to get their vehicles away from the burning tanks. As the heavy machines rolled slowly forward they set off the Teller mines in their tracks. Detonation followed detonation and soon seven vehicles had blown up and were burning. The Paras made off in the dark, pausing only to lay a belt of mines across the road to slow down any pursuit.*” *Kommando, German Special Forces of World War II*, by James Lucas, St. Martin’s Press, New York, page 96. *Oberst* Witzig later commanded the 21<sup>st</sup> *Fallschirmjioniern* Regiment and the 18<sup>th</sup> *Fallschirmjager* (airborne infantry) Regiment of the 6<sup>th</sup> *Fallschirmjager* Division during the campaigns in France and Germany in 1944-45. After the war, *Oberst* Witzig went on to command the *Pionierschule* of the *Bundeswehr* in Munich.

*Alamein lines to lay mines. On some occasions, we ventured as far out as the British minefields to clear a path. Sometimes, we were so close to them that we could see their cigarettes glowing in the dark. Working silently and removing anti-personnel mines from the rocky ground was a very hazardous job. I don't know how many comrades were killed by our ordnance or by that of the British. Initially, three of us shared the same hole, but by mid-October, I was the only one left after my two companions had been blown to smithereens by land mines.”<sup>83</sup>*

The engineers of the 8<sup>th</sup> Army could also be quite creative in this psychological game of mine warfare, as shown by the example of the South African engineers. Their commander, General Daniel Pienaar, was always looking for ways to make things unpleasant for his opponents. He would send out patrols to emplace Italian-made mines in front of German positions and German-made mines in front of those of the Italians. The general remarked, “*They don't get on too well at the best of times, and this should make it a little worse.*”<sup>84</sup>

In the southern sector, the Italian *Folgore* Airborne Division and *Brescia* Infantry Division were protected by captured Allied minefields around Deir el Shein and Bab el Qattara as well as two large minefields along the southern end of the front (which the British had code named January and February). These Allied minefields contained about 181,010 mines of all types (including flame mines improvised from fuel cans and fitted with a trip wire fuze<sup>85</sup>). These minefields were captured during the series of engagements that became known as the Battle of Alam Halfa and were “*some 200 to 1000 yards wide according to the terrain and of a varying pattern of a core of ten or so rows of closely spaced mines inside two belts more widely spaced. From the depressions to the Himeimat the mines were continuous except for narrow patrol gaps and, though the fields grew thinner the further south they went, they made a difficult obstacle for vehicles by reason of their maze like pattern.*”<sup>86</sup> All of the mines removed by British reconnaissance patrols from the closest minefield (January) prior to the battle were either British Mark IVs or E. P. (Egyptian Pattern). None had been found with anti-handling devices. Also, only a small number of antipersonnel mines had been found by the 8<sup>th</sup> Army's reconnaissance patrols, all were British made Mark II shrapnel mines which had been emplaced by the allies earlier in the year and had been rendered inoperative by the elements.<sup>1</sup> To strengthen these minefields, the Italian X Corps and Ramcke Brigade had laid at least 39,660 antitank mines and 11,136 antipersonnel mines by the end of the 2<sup>nd</sup> Battle of El Alamein (see Table 4). In addition, behind the main line of defense, near the positions held by the counterattack force (consisting of the 21<sup>st</sup> Panzer and *Ariete* divisions) were the minefields emplaced by the Axis prior to the Battle of Alam Halfa (constituting about 35,000 mines by the end of August).<sup>87</sup>

The progress of the engineers at emplacing the minefields was meticulously tracked by Major Feige, the *panzerarmee's* acting Ia (operations officer), on his situation maps. On 21 October, just before the beginning of the battle, *Oberst* Hecker reported that his engineers had emplaced a total of 264,358 mines, of which 249,849 were antitank mines and 14,509 were antipersonnel mines. Of these, the German pioneers had emplaced 198,004 (190,509 antitank mines and 7,495 antipersonnel mines), while the Italian engineers had emplaced 66,354 (59,340 antitank mines and 7,014 antipersonnel mines). Combined with the aforementioned 181,010 mines in the old Allied minefields captured during the summer battles, the *panzerarmee* was protected by a reported total of 445,358 mines of all types at the beginning of the battle. Ironically enough, about 361,000 of these mines (81%) came from the Allies (captured stocks, recovered mines, and existing minefields).<sup>88</sup>

By the end of the battle (according to the *panzerarmee* pioneer records for the period between 10 July and 1 November 1942), the combined effort of the German and Italian pioneers resulted in the emplacement of 288,641 antitank, 25,222 antipersonnel mines (including improvised antipersonnel mines), and 1,289 improvised explosive devices in the Devil's Gardens (Table 4). These improvised explosive devices included at least 842 captured British aircraft bombs rigged for command detonation and/or tripwire, 252 command detonated demolition charges, and 195 command detonated mines. Eventually, the *panzerarmee* was protected by minefields, containing 496,141 mines of all types (including at least 10,134 antitank and 4,659 antipersonnel mines emplaced during the battle from 23 October to 1 November, as well as, 174 kilometers of wire entanglements) (Table 5). This results in an average density of about 7,455 antitank and 420 antipersonnel (including improvised explosive devices) mines per kilometer of front. In addition, a large number of dummy minefields were emplaced to increase the apparent depth of the

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<sup>i</sup> “Engineers at the Battle of Alamein, The Southern Sector” page 24. This is a significant issue that US engineers frequently overlook. Some current US mines have an estimated failure rate of 30% in 6 months (without special preparation) in some conditions. See *Operator's and Unit Maintenance Manual for Landmines*, TM 9-1345-203-12 (with Change 2), Headquarters, Department of the Army, 30 September 1997, pages 2-6, 2-12, 2-25, 2-47, 2-56, and 2-56.



actual minefields.<sup>i</sup> Although the quantity and quality of the defensive obstacles emplaced by the Axis engineers at El Alamein were a truly impressive achievement, logistic constraints left the defenses well short of the approximately 858,000 mines and 3,000 kilometers of wire entanglements required by *Generalfeldmarshall* Rommel's plan. Most critically, only 17% of the required antipersonnel mines (25,222<sup>ii</sup> out of 152,000) and 6% of the wire entanglements (174 kilometers out of 3,000 kilometers) were available and emplaced.

**TABLE 4. AXIS MINE LAYING EFFORT<sup>89</sup>**

	July*			August**			September***			October****			Total		
	AT	AP	IED	AT	AP	IED	AT	AP	IED	AT	AP	IED	AT	AP	IED
Pz. Pl. 33	21,499		222	300			1,479			3,075	100		26,353	100	222
Pz. Pl. 200***	3,854	222			458		6,447			5,386	601		15,687	1,281	
Pi. 220	5,427			33,635	56	358	2,916	611	177	9,509	3,613	85	51,487	4,280	620
Pi. 900	27,935	386	116	3,177	447	198	8,984	733		721	234		40,817	1,800	314
Ramcke Bde										10,788	1,727		10,788	1,727	
S. V. 288				772									772		
D. A. K.	13,860			18,512		24	20,408	150		3,072			55,852	150	24
A. A. 3	116			96			479						691		
A. A. 33										150	114		150	114	
German Total	72,691	608	338	56,492	961	580	40,713	1,494	177	32,701	6,389	85	202,597	9,452	1,180
X. It. Corps	6,547			1,100			6,838	910		22,034	8,499		36,519	9,409	
XX. It. Corps	500									2,000			2,500		
XXI. It. Corps	19,939			11,930	247	109	2,550	667		7,845	4,638		42,264	5,552	109
Young Fascists Div											710			710	
Italian Total	26,986			13,030	247	109	9,388	1,571		31,879	13,847		81,283	15,671	109
Unknown	2,264			2,497	99								4,761	99	
Axis Total	101,941	608	338	72,019	1,307	689	50,101	3,071	177	64,580	20,236	85	288,641	25,222	1,289

\*May be as many as 1,927 'S' mines emplaced during this period, see US National Archives, Captured German Records Division, Series T-313, Roll 431, Frames 8,724,305.

\*\*According to "Minenkampf im Afrikafeldzug," the *panzerarmee* emplaced a total of 97,865 mines in August 1942.

\*\*\* According to "Minenkampf im Afrikafeldzug," the *panzerarmee* emplaced a total of 113,165 mines in September 1942, while *Die 5. (lei.) 21. Panzer Division in Nordafrika, 1941-1943*, page 267, states that the 200<sup>th</sup> Panzer Pioneer Battalion had laid a total of 130,700 mine from late June to 20 September 1942.

\*\*\*\*Includes 1,523 antitank mines and 100 antipersonnel mines emplaced by the 33<sup>rd</sup> Panzer Pioneer Battalion on 1 November.

**TABLE 5. AXIS WIRE ENTANGLEMENTS<sup>iii</sup>**

Location	Quantity
Mine Box H North	14 km
Mine Box H South	35.6 km
Mine Box J and adjacent areas	20.3 km
Mine Box K and adjacent areas	25.4 km
Mine Box L and adjacent areas	40.6 km
Mine Box B and Strongpoint Deir el Shein	38.1 km
Total	174km

#### 4.3.2.4. 'MOBILE OBSTACLE DETACHMENTS'

The pioneers continued to emplace mines even after the battle had been joined on 23 October. During the battle, German and Italian pioneers were hastily emplacing 4,000 to 5,000 mines per day in front of the attacking Allies, along the expected lines of attack. This is one of the earliest examples of mobile obstacle teams being used in

<sup>i</sup> There is not much information on the effectiveness of these dummy minefields, however, "Notes on Eighth Army Minefield Clearance," Military Reports on the United Nations, No. 5, Military Intelligence Service, War Department, Washington, D. C., 15 April 1943, page 25, reports that one regiment of the 2<sup>nd</sup> Armoured Brigade, 1<sup>st</sup> Armoured Division was channeled into an engagement area by a dummy minefield and lost several tanks in the process.

<sup>ii</sup> Of which at least 3,360 were S-mines. US National Archives, Captured German Records Division, Series T-313, Roll 432, Frames 8,724.841 to 8,724.853 plus a report from the 220<sup>th</sup> Pioneer Battalion dated 11 October 1942 on Frames 8,723.489 and 8,723.490.

<sup>iii</sup> Estimated from information in Appendix E, Axis Obstacle Plan.



combat. These tactics would later be used to great effect by the Soviets at Kursk, in July 1943. One American observer noted that *"German mine-laying technique is so highly developed, however, that, the new minefields are laid almost as rapidly as old ones are penetrated and cleared...Some of these were not surrounded by wire, and on two occasions such unexpected fields held up British plans for 24 hours, while gaps were systematically opened."*<sup>90</sup> By 31 October, a week into the battle, the Axis would have only 40,000 of the dangerous and unpopular dual-purpose Italian V3 mines left.<sup>91</sup> *Hauptmann Hinrich's* veteran 33<sup>rd</sup> Panzer Pioneer Battalion lost 1 officer, 2 noncommissioned officers and 28 soldiers in a single accident with this type of mine between 29 October and 1 November.<sup>92</sup>

#### 4.3.3. OTHER ENGINEER TASKS

As usual, it is impossible to provide detailed information on all of the other areas of engineer responsibility. However, as an overview, the Axis engineers were required to perform extensive survivability and mobility work as well as well drilling and cartographic support.<sup>93</sup> The German 58<sup>th</sup> *Bau* (Construction) Battalion and twenty Italian labor companies were employed in the improvement of harbor facilities, the coastal railroad, airfields, and the routes behind the front. In addition, the 3<sup>rd</sup> Company, 58<sup>th</sup> *Bau* Battalion was also used to manufacture improvised mines at Benghazi in September.<sup>94</sup> They were expected to assemble about 100,000 mines.<sup>95</sup> The 778<sup>th</sup> Pioneer Landing Company operated about 30 ferries (including three of the famous Siebel ferries) that provided critical logistic support to the entire *panzerarmee*.<sup>96</sup>

The only construction assets available within the *panzerarmee* that were any heavier than the pick and shovel were a few compressors and jackhammers assigned to the artillery and the 58<sup>th</sup> *Bau* Battalion. Neither the Germans nor the Italians had bulldozers, so antitank ditches could not be dug in the hard ground at El Alamein. Because of the extremely hard soil and lack of construction materials (and no trees to cut down), the Axis was unable to construct hardened bunkers as was their preference, indeed, many infantry positions still had only breastworks of piled rocks or sandbags (called "sangars") by the time the battle began (photos 27-30).<sup>97</sup> These positions were to prove to be extremely vulnerable to artillery. This lack of heavy construction equipment forced many of the headquarters units to locate in the underground cisterns that were fairly common in the area.

The lack of construction assets was a significant concern to *Generalfeldmarshall* Rommel. On his way to Germany for sick leave, he stopped in Rome where, *"On the 23<sup>rd</sup> September I reached the following agreements with the Italians: The Italians in Libya were to provide 3,000 men to build a road behind the front. Continued driving over unmetalled tracks, mostly covered with deep sand and pitted with holes up to eighteen inches deep, was ruining our vehicles, especially as our drivers usually drove like the devil and without any regard for their vehicles. The spare part situation was so bad that we could no longer afford this wastage.*

*The Italians agreed to ship 7,000 tons of railroad rail and railroad ties to Africa for the construction of railway communications...*

*It is interesting to compare Cavallero's promises with what was actually done by the middle of October.*

*When General Barbasetti received the demand for 3,000 men, he declared that he was not in a position to provide that number and that the most he could spare was 400. Of these 400, only a little over 100 actually arrived and so the road could never be built.*

*Similarly, there arrived neither the rails nor cross ties. The only work that was done on the railway was by the men of the 90<sup>th</sup> Light Division."*<sup>98</sup>

<sup>91</sup> *The Rommel Papers*, page 293. Author's note: *Generalfeldmarshall* Rommel had organized a similar road building effort to bypass the besieged allied garrison in Tobruk in 1941. "Rommel's plan was greeted with enthusiasm. It swiftly became concrete. Conferences were held with the Italian Divisional commanders, and as a result troops were made available at short notice to begin building the loop road. German battalions were also detailed for the work, but they preferred front-line duty and, after appeals, were all allowed to replace other Italians who were at combat stations.

*"The road was speedily surveyed and marked. There was an ample supply of stone in this rocky desert, and no especial shortage of sand. Soon 3000 Italians were working hard and enthusiastically at a task, which seems to suit their talents admirably. Traveling along sections of the road that were partly completed, I ceased to be surprised to find large Chianti bottles and barbers' establishments.*

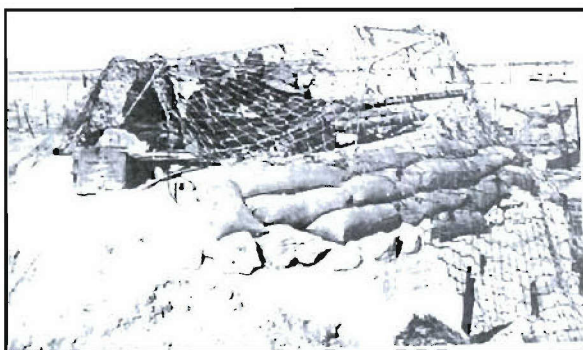
*"The road was finished in three months. An Italian general performed an official opening ceremony and named it 'Achsenstrasse' - Axis Road. It was a feature of life in the desert for both sides, from then on until the end of 1943."* From *With Rommel in the Desert*, by Heinz Werner Schmidt, George G. Harrap & Co. Ltd, London, 1952, pages 67-68. See also "Panzer Group Africa Engineer Officer, (26 Aug-Sep 41)," page 12.



**PHOTO 27. Digging in with Pioneer Tools, Virtually no Mechanical Construction Equipment was available to the Typical Axis Unit**



**PHOTO 28. A Machine Gun Emplacement of the *Brescia* Division**



**PHOTO 29. A Dug-in Italian 47/32 Breda Antitank Gun Covering the Wire and Minefields to its Front. Many Axis Positions (like this one) had to be Built above Ground due to the Rocky Conditions**



**PHOTO 30. A Dug-in Axis Command Post**

#### **4.4. FIRE SUPPORT**

Against about 900 Allied artillery pieces with plenty of ammunition the *panzerarmee* had 677 pieces (273 German and 404 Italian) with very limited ammunition. Typically, each German division was authorized an artillery regiment of 3 battalions. Two of these battalions were authorized twelve of the le FH 18 10.5cm howitzer, which had a range of 10.6 kilometers. It was slightly out-ranged by the British 25-pounder gun-howitzer (range 12.3 kilometers). The le FH 18 was the mainstay of the German artillery in North Africa. The other battalion in the division artillery was authorized eight of the s FH 18 15cm howitzer with a range of 9.7 kilometers (13.2 kilometers in emergencies) and four 10cm K18 guns with a range of 19.1 kilometers. This firepower was augmented by the infantry's regimental cannon companies (authorized two 15 cm sIG 33s and six 7.5cm leIG 18s), which provided direct fire support as well as the battalion mortars (normally six 8cm mortars per infantry battalion).

Even though the Italian divisional artillery typically had a greater weight of fire than its opponents (Table 6), the lack of sufficient prime movers and the resulting lack of mobility was a significant disadvantage against the 8<sup>th</sup> Army's artillery. The Italian infantry division's artillery regiment normally had two to four field artillery battalions (equipped mostly with 75/27 guns (10 kilometers range) and 100/17 howitzers (9.1 kilometers range)). The Italian armored division's artillery regiment typically had two to three field artillery battalions (equipped mostly with 75/27 guns and either 105/28 guns (13.5 kilometers range) or 100/17 howitzers). In addition, two battalions of self-propelled 75/18 *Semoventes* (similar in many ways to the better known German Stug IIb assault gun) were authorized for direct fire support. In partial compensation for the shortcomings of their divisional artillery, the Italians' corps artillery did possess some highly effective pieces including the 105/28 gun and the 149/40 Ansaldo gun with a range of 21.9 kilometers. Indeed, the 149/40 Ansaldo was roughly equivalent to its German and British



counterparts. Despite its shortcomings, the artillery was considered by some to be the most effective of the Italian combat arms.<sup>98</sup>

The Germans assigned separate corps and army level artillery units for counter-battery missions. In North Africa, this was the task of the 104<sup>th</sup> Army Artillery Command (ARKO). The 104<sup>th</sup> ARKO underwent a significant reorganization, ordered on 23 September 1942, in an attempt to simplify its command and control requirements by consolidating various independent batteries and battalions. This process created two army-level units, called *Afrika Artillerie* regiments 1 and 2. The first regiment was allocated three mixed artillery battalions. These were typically organized with three batteries each: one with three 21cm *Morser* 18 howitzers, one with four 10cm K18 guns, and a battery of four captured British 25-pounder gun-howitzers. *Afrika Artillerie* Regiment 2 was allocated four artillery battalions. One battalion had three batteries of 17cm K18s (3 guns each). Two battalions had three batteries each, typically equipped with four French 155mm howitzers. The last battalion had three batteries of 15cm K16 guns (4 guns per battery). As of 23 September, the 104<sup>th</sup> ARKO was assigned nine 21cm *Morser* 18 howitzers, nine 17cm K18 guns, eighteen 15cm K16 guns, eight 10cm K18 guns, and four 15cm sFH18 howitzers as well as twenty French 155mm howitzers, eighteen British 25-pounder gun-howitzers, and four 4.5-inch (114mm) British guns. *Generalfeldmarshall* Rommel's artillery was supplemented, in early 1942, with twelve sIG 33 15 cm self-propelled artillery pieces as well as twenty-three 15 cm sFH 13/1 self-propelled howitzers that were assigned to the 15<sup>th</sup> and 21<sup>st</sup> panzer divisions (See Table 6 and Appendix I, Axis Order of Battle). However, these had been reduced during the spring and summer campaigns to eight of sIG 33 self-propelled guns and nineteen of the sFH 13/1 available by 23 October.<sup>99</sup>

The *panzerarmee*'s varied artillery inventory, of course, further complicated *Generalfeldmarshall* Rommel's already difficult logistic situation. The Axis had to supply 27 different calibers of shell to their field artillery (as opposed to just 4 calibers on the Allied side), including 5 captured types not manufactured in Germany or Italy (see Table 6). Indeed, the *panzerarmee* had only 9 days supply of ammunition by the middle of October.<sup>100</sup> *Generalfeldmarshall* Rommel planned to use his limited fire support assets in conjunction with the outpost line to inflict maximum casualties on the 8<sup>th</sup> Army while they were assembling and during their breaching operations.<sup>101</sup>

**TABLE 6. AXIS FIELD ARTILLERY<sup>102</sup>**

Equipment	Origin	Number	Range (km)	Wt. of Shell (kg)	Rate of Fire (rpm)
7.5 cm leIG 18	Ger	17	3.4	6.0	6
75/18 Semovente SP	It	35	9.4	5.50	
15 cm sIG 33	Ger	8	4.7	38.0	
15 cm sIG SP	Ger	19	4.7	38.0	
65/17 gun	It	36	6.5	4.15	(20)
7.5 cm LG40	Ger	8	6.8	5.83	(3)
7.5 cm GK15	Ger	8	6.6	5.47	(20)
75/27 guns	It	167	10.0	6.3	20
7.62 cm	USSR	5	13.5	6.25	(20)
77/28 guns	It	24	7.0	5.99	(20)
8.75 cm gun-howitzer	UK	50	12.3	11.34	2
100/17 howitzers	It	90	9.1	12.7	(6)
105/28 gun	It	36	13.5	15.87	6
10.5 cm LG40	Ger	8	8.0	14.8	(3)
10.5 cm French	France	4			(6)
10.5 cm leFH 18	Ger	60	10.6	14.81	6
15 cm sFH 18	Ger	20	9.7*	43.5	2
15 cm sFH13 SP	Ger	8	8.6	43.5	(2)
10 cm K17	Ger	8	16.5	18.5	(6)
10 cm K18	Ger	8	19.1	15.14	6
11.4 cm gun	UK	4	22.2	25.0	2
149/28 guns	It	5	13.4	43.4	(2)
149/40 guns	It	9	21.9	50.79	2
15 cm K16	Ger	18	22.0	51.4	2
152/37 guns	It	2	21.8	53.97	½
15.5 cm 419(f)	France	20	19.5	43	1
17 cm K18	Ger	9	29.6	62.8	(1)
21 cm Morser 18	Ger	9	16.7	113.0	(½)

\* 13.2 km in emergencies

() Indicates an estimated quantity

The German *Luftwaffe's II Fliegerkorps* under General Eduard Neumann and the Italian *Regia Aeronautica's 5<sup>th</sup> Squadra* under General Mario Bernasconi provided air support to the *panzerarmee*. The *Luftwaffe's II Fliegerkorps* had about 360 aircraft available: 35 Ju. 88s; 153 Bf-109 fighters; 27 Bf-109 fighter-bombers; 111 Ju. 87 Stukas; 18 Bf 110s; 18 reconnaissance aircraft (a mix of FW 189s, Hs 126, and Bf 109fs); as well as, about 40 support aircraft (Fi 156, Do. 17, Do. 24, Ju. 52, W. 34 (communications) and FW 58 (liaison)). Of these, about 110 aircraft (31%) were operational. The Italian 5<sup>th</sup> *Squadra* had about 400 aircraft available: 26 Cant. 1007 Bis bombers, 30 SM.79 torpedo bombers, 107 CR.42 biplanes, 73 MC. 200 fighters, 60 MC 202 fighters, 43 G.50, 26 Cant. 501 and Cant. 506, and 23 Ca. 311. Of these, about 260 aircraft (65%) were operational. In addition, the *Regia Aeronautica* had about 50 auxiliary aircraft available, including a mix of SM.79, SM.81, SM.82, and Ca. 309 aircraft as well as three bomber groups (Cant. Z. 1007), one dive-bomber group (JU-87 Stuka), one fighter-bomber group (Re.2001), and three fighter groups (MC. 202) based in Sicily. Of these, about 8 dive-bombers, 18 level bombers and 62 fighters were operational.<sup>1</sup> Like their ground troops, Axis air power based in North Africa was severely handicapped by a shortage of fuel and ordnance. This situation was made more difficult by a lack of forward airfields and the recent blow to *Luftwaffe* morale caused by the death of their leading Ace in North Africa, Joachim Marseilles (with 158 kills) who died in a crash on 30 September.<sup>103</sup> (See Appendix I for detailed order of battle)

#### 4.5. AIR DEFENSE

Given the lack of available airpower, the primary means of air defense fell to the Axis anti-aircraft gunners. Regrettably, information on Axis air defense capabilities is sketchy, but their units possessed 86 of the dreaded 88mm dual-purpose antiaircraft/antitank guns (36 of which were manned by Italian crews) plus 8 of the equally lethal Italian-90/53 dual-purpose antiaircraft/antitank guns. The primary anti-aircraft weapons for the *panzerarmee* were the numerous 2cm rapid-fire flak guns (approximately 1350 on hand).<sup>104</sup> Many of the German antiaircraft guns were from XIX *Luftwaffe* Flak Division and were spread throughout the width and depth of the *panzerarmee's* defensive array (see Appendix I, Axis Order of Battle).

#### 4.6. LOGISTICS

For all of its other shortcomings, its logistic deficiencies were the primary weakness of the *panzerarmee*. *General der Panzertruppe* Ritter von Thoma, commander of the *Deutsches Afrika Korps* during the Second Battle of El Alamein, had been sent to North Africa in October 1940, two months before General Wavell's stunning victories forced the Italians out of Cyrenaica. Upon the completion of this trip, *General der Panzertruppe* von Thoma was tasked to report on whether German forces should be sent to North Africa to help their Italian allies drive the British from Egypt. *General der Panzertruppe* von Thoma described his report to Hitler, "After seeing Marshal Graziani, and studying the situation, I made my report. It emphasized that the supply problem was the decisive factor-not only

<sup>1</sup> The best sources for information on Axis air power in North Africa appear to be *La Regia Aeronautica, 1939-1943, Volume Terzo, 1942 L'Anno Della Speranza*, by Nino Arena, Stato Maggiore Aeronautica, Ufficio Storico, Rome, 1984, pages 227-233, and "Der Einsatz der Luftflotte 2 (O.B. Sued) ab November 1941 bis zur alliierten Landung November 1942," by General der Flieger Hans Seidemann, MS # D-160, Foreign Military Studies, Headquarters, US Army Europe, 10 April 1947, pages 41, 42. "The Luftwaffe in Libya and Cyrenaica, (Oct-Nov 1942)," by Generalmajor Hans-Joachim Rath, MS # D-123, German title: "Der Einsatz der Luftwaffe im Rueckwaertigen Gebiet Libyen-Cyrenaika Oktober/November 1942," Foreign Military Studies, Headquarters, US Army Europe, pages 3, 4. Given the extreme flexibility and mobility of air power, information on the number, type and status of aircraft varies considerably between sources. For example, the Italian Official History (*Le Operazioni in Africa Settentrionale, Vol III-El Alamein*) reports that the Germans had 156 operational bombers and 58 operational fighters composed of four groups of ME-109s fighters and seven bomber groups, (six of JU-88s and one of HE-111s). This appears to include "cooperating" aircraft from X Fliegerkorps. The British Official History (*The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV*, page 3) states that the Axis had a total strength 750 aircraft on-hand, of which about 350 were serviceable. Out of 475 Italian aircraft on-hand, 200 were serviceable, mostly C-202 *Folgore* (Lightning) fighters. Out of 275 German aircraft on hand, 150 were serviceable (ME 109s and 80 dive-bombers (mostly Ju-87 *Stukas*) but no medium bombers). In addition, the Germans had about 225 medium bombers, of which 130 were serviceable, in Greece, Crete, Sicily, and Sardinia as well as a fleet of about 300 German and Italian transport aircraft. However, these bomber aircraft were committed primarily to the attacks against Malta or were being used to fly in critical logistics. While noted airpower historian, Edward Jablonski (in *Outraged Skies*, page 10) states, "Kesselring on paper may have appeared to have an impressive array of air power at his disposal. But as Commander in Chief, South, the about 3000 planes under his command were dispersed quite tenuously throughout the vast Mediterranean and the Balkans. And the new Fliegerfuehrer Afrika, General der Luftwaffe Hoffman von Waldau, could count on little more than 600 of those rather widely scattered forces. On the eve of Montgomery's offensive he had about 380 fighters, of which most were Italian and only 165 Me-109Fs; he had about 150 bombers plus 75 Italian attack planes and a few sea planes and reconnaissance aircraft. But of these only about half were operational, thanks in part to the disruption of Axis supply routes into north Africa by Allied air and sea effort."



because of the difficulties of the desert, but because of the British Navy's command of the Mediterranean. I said it would not be possible to maintain a large German Army there as well as the Italian Army.

"My conclusion was that, if a force was sent by us, it should be an armoured force. Nothing less than four armoured divisions would suffice to ensure success-and this, I calculated, was also the maximum that could be effectively maintained with supplies in an advance across the desert to the Nile valley. At the same time, I said it could only be done by replacing the Italian troops with German. Large numbers could not be supplied, and the vital thing was that every man in the invading force should be of the best possible quality.

"But Badoglio and Graziani opposed the substitution of Germans for Italians. Indeed, at times they were against having any German troops sent there. They wanted to keep the glory of conquering Egypt for themselves. Mussolini backed their objections. While, unlike them, he wanted some German help, he did not want a predominantly German force."<sup>105</sup>

General der Panzertruppe von Thoma continued, "When I rendered my report, Hitler said he could not spare more than one armoured division. At that, I told him that it would be better to give up the idea of sending any force at all. My remark made him angry. His idea in offering to send a German force to Africa was political. He feared Mussolini might change sides unless he had a German stiffening. But he wanted to send as small a force as possible." So, once again, German strategic goals were based on an inadequately resourced operational plan. Indeed, Generalfeldmarshall Franz Halder presciently remarked to General der Panzertruppe von Thoma, "Our danger is that we win all the battles except the last one." Now, less than two years later, what Generalfeldmarshall Halder and General der Panzertruppe von Thoma had foreseen, was about to become reality.<sup>106</sup>

In preparation for the battle, the *panzerarmee* faced many difficult logistic problems. Before leaving for Europe, Generalfeldmarshall Rommel estimated his minimum needs as 8 daily issues of ammunition, 2,000 kilometers worth of fuel per vehicle, and 30 days rations but he was well short of some of these critical supplies.<sup>107</sup> However, the whole Axis logistic system for North Africa was clumsy with neither the Italians nor the Germans in full control. There was also much friction over the proportion of cargo space allotted to the Germans, a fact about which Generalfeldmarshall Rommel frequently complained. For example, during the period 1-20 August, the Italians took over 15,000 tons of supply, leaving only 3,261 tons for the *Luftwaffe* and 5,271 tons (of which 2,854 tons of fuel and 482 tons of munitions) for the German units of the *panzerarmee*.<sup>108</sup> Promises, to provide needed equipment or personnel, – whether railway materials, labor units, anti-aircraft guns, heavy tanks or engineer troops – were almost always qualified by 'if' or 'when.' The usual result was that nothing happened. Most of the German and Italian senior officers recognized the problems and suggested changes, but most of the solutions remained on paper simply because there was insufficient time to implement them.<sup>109</sup> Generalmajor von Ravenstein, one of the commanders of the 21<sup>st</sup> Panzer Division, called the campaign in North Africa "the tactician's paradise and the quartermaster's nightmare."<sup>110</sup> Nevertheless, the principal cause of their problems was the limited capacity of the Libyan ports (Table 7) and, above all, the long distances from the ports to the fighting front. In 1941, ten percent of the fuel was needed to simply transport the *panzerarmee*'s supplies to the front around Tobruk. Now at El Alamein, the situation was much worse because the frontline troops were another 650 kilometers away from their major supply ports. However, the importance of naval and air interdiction appears to have been exaggerated by many historians. Indeed, only 15% of supplies, 8.5% of personnel, and 8.4% of ships sent from Italy to Libya in the period 1940-1943 were lost at sea, however, by carefully exploiting the information made available through "Ultra," the Allies were able to significantly increase Axis losses of critical items at select times.

The Axis decision not to invade Malta was less critical than the fact that the port of Tobruk was of limited capacity and exposed to air attack from Royal Air Force units operating from Egypt. The *Wehrmacht* considered 300 kilometers to the normal limit for effective supply range of an army by truck. At El Alamein, the *panzerarmee* was 1,300 kilometers from the port of Benghazi. In recognition of the difficulties of operating in North Africa, the *Wehrmacht* had allocated each of the two panzer divisions of the *Deutsches Afrika Korps* thirty-nine "supply columns" (each of thirty 2-ton trucks). These would be adequate to support them at a range of 500 kilometers with the required 350 tons of supply per day. In proportion to the size of the forces under his command, Generalfeldmarshall Rommel required no less than 20 times the amount of trucks compared to those allocated to the armies that participated in Operation Barbarossa (the invasion of the Soviet Union).

**TABLE 7. LIBYAN PORT FACILITIES**

Port	Capacity (tons per month)	Distance to El Alamein (kilometers)	Remarks
Tripoli	50,000	2,300	
Benghazi	81,000	1,300	
Tobruk	45,000	650	Due to Allied air and naval pressure, rarely exceeded 18,000 tons per month

For the period January through July, 107,000 tons had reached the *panzerarmee*'s troops at the front, an average of 15,000 tons per month, about half of their minimum requirements.<sup>111</sup> During the summer and fall of 1942, Axis strength in North Africa reached 12 (+) divisions. This force required about 120,000 tons per month. With the capture of Tobruk in June 1942, the *panzerarmee* acquired about 2,000 vehicles, 5,000 tons of supplies, and 1,400 tons of fuel. After the fall of Tobruk, *Generalfeldmarshall* Rommel decided that his best chance for victory was to "flee forward" and attempt to live off of supplies captured from the 8<sup>th</sup> Army.

That summer, *Generalfeldmarshall* Rommel had remarked, "Give me three shiploads of gasoline for my tanks-and I'll be in Cairo 48 hours later!" However, aircraft flying from a resurgent Malta were able to sink much of the *panzerarmee*'s critically needed supplies. In August, in an attempt to meet the *Deutsch-Italienischen Panzerarmee*'s logistic requirements, the Italians sent their ships directly to Tobruk. As a result, losses increased by a factor of four with only 51,000 tons reaching North Africa. Disregarding protests from the *panzerarmee*, in September and October, the Italians switched back to Tripoli and Benghazi, delivering 77,000 tons and 71,000 tons respectively. However, the distance from the ports to El Alamein caused severe wastage and delays. In September, the *panzerarmee* was forced to cut the bread ration in half, resulting in undernourishment and a high sickness rate among Axis soldiers. *Generalfeldmarshall* Rommel estimated that his army at the front needed 30,000 tons of supplies in September and 35,000 tons in October.<sup>112</sup> However, during September the *panzerarmee* received only 16,200 tons (54% of requirement) of supply. In October, the Axis lost 44% of its shipping on 17 merchant ships.<sup>1</sup> Considerably more than half of the ships lost were Italian (Table 8).<sup>113</sup> When *Generalfeldmarshall* Rommel traveled to Berlin in September 1942, he carried a report in which he stated, "Unless the *panzerarmee* is given the necessary supplies to continue the fight for the long run against the combined powers of two world empires, the British Empire and the United States of America, sooner or later, it will suffer the fate of the Halfaya garrison." However, the *Wehrmacht* was misled by the previous outstanding successes of the *panzerarmee*, and believed they could overcome the current difficulties and expected them to renew the advance to the Suez Canal in the near future.<sup>114</sup>

Fuel was the *panzerarmee*'s greatest concern. They needed 600 tons of fuel every day; 300 tons just for routine convoys.<sup>115</sup> In the *panzerarmee*'s last logistic status report before the battle, dated 19 October, they had only three "issues of fuel" per tank (one issue equaled the amount of fuel required to move one panzer 100km under normal (not battle) conditions). There was only enough fuel (about 2,613 tons<sup>116</sup>) in North Africa for about 11 days at current consumption rates, and not all of this fuel had been brought forward to the thirsty panzers at El Alamein yet, one issue was still at Benghazi. Indeed, by the beginning of the battle on 23 October, only about a week's worth of fuel remained. *Generalfeldmarshall* Rommel believed that ten times this amount was the minimum requirement for the upcoming battle. In November, the *panzerarmee* would receive only 26% of their required supplies (see Table 9).

<sup>1</sup> There is significant disagreement between sources on the amount supplies actually reaching North Africa, authors Jack Greene and Alessandro Massignani in *Rommel's North Africa Campaign, September 1940 – November 1942*, page 181, claim that 182,074 tons reached North Africa in September (15,127 tons sunk out of 197,201 shipped) and put the shipping losses at only 16% (32,572 tons out of 205,599) for October. They do point out however, that the loss of fuel tankers was significant. *Hauptmann* Hans Hinrichs, commander of the 33<sup>rd</sup> Pioneer Battalion, for example claims ("El Alamein 1942, Schlacht ohne Hoffnung," *Europäische Wehrkunde* 10/82, page 451) that in the first 8 months of 1942, only 40% of the required 300,000 tons of supply had reached the *Panzerarmee*. It should be pointed out that the numbers given in Table 8 are gross tonnages and not payload tonnages. The rest of the difference may lie in the amount of supplies required by other functions in the Italian colony of Libya and those supplies consumed on the way to delivery to the *panzerarmee*. The most thoroughly researched account of the Axis supply situation appears to be "Rommel's Supply Problem, 1941-42," by Martin van Creveld, *Journal of the Royal United Services Institute for Defence Studies*, September 1974, pages 67-73. See also *The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV*, page 25.

**TABLE 8. AXIS SHIPPING LOSSES, JUNE-OCTOBER 1942<sup>117</sup>**

Month	Embarkations		Losses		
	Merchant ships	Gross Tonnage	Date	Ship*	Cargo
June	29	135,847		(6 total)	20,016 tons
July	90	274,337		(7 total)	15,588 tons
August	64	253,005	27	Istria de Dielpi	
			30	San Andrea	2,411 tons of fuel
				(12 total)	65,276 tons
September	91	197,201	2	Picci Fassio	1,100 tons of fuel
			4	Bianchi	
			4	Padenna	
			28	Barbaro	Tanks, ammunition, food, vehicles
				(12 total)	36,934 tons (20% of total sent)
October	62	205,599	20	Panuco**	1,650 tons of fuel
			26	Proserpina	3,000 tons of fuel
			26	Terestea	1,000 tons of fuel 1,000 tons of ammunition
				(29 Total***)	56,169 tons (44% of total sent)
June – October	336	1,065,989		66	193,983 tons

\*Only includes ships over 500 ton cargo. During the period June to August, another 17 vessels of less than 500 tons cargo were also lost.

\*\* Damaged and returned to Italy without delivering its cargo

\*\*\* Includes Italian ships only, one German source indicates that shipping losses for this period total 'only' 23 ships with 140,067 tons

In addition to its fuel problems, the army had only enough ammunition at the front for nine days of fighting. The Italians only had 8,500 rounds of armor piercing ammunition for their 88/55's and 6,000 for the 90/53's (see Table 10).<sup>118</sup> The *Deutsches Afrika Korps* reported having 695,000 rounds of small arms ammunition, 8,100 rounds of 2cm, 250 rounds of 3.7cm, 16,280 rounds of 5cm, and 600 rounds of 7.62cm. For the panzers, there was only 14,500 rounds of 5cm (short)(1.5 loads per tank), 11,250 rounds of 5cm (long)(1.4 loads per tank), 1,750 rounds of 7.5cm (short)(2.2 loads per tank), and 3,750 7.5cm (long)(1.4 loads per tank). This was enough to provide each panzer with about 250 rounds. In addition, there were 2,400 for the self-propelled 7.62cm guns, 2,390 8cm mortar rounds, 624 rounds for the 15cm infantry gun, 4,500 rounds of 10.5cm howitzer, 1,200 rounds of 15cm howitzer, 880 rounds for the self-propelled 15cm howitzer, 720 rounds of 10cm gun and 2,200 rounds of captured 25-pounder.<sup>119</sup>

There was also a critical shortage of tires and spare parts for the vehicles; as a result, nearly one third of them were in the shops. To further complicate the situation, many of the vehicles being used had been captured from the Allies and, therefore, were very difficult to get parts for.<sup>120</sup> Indeed, during the summer campaign, *Generalfeldmarshall* Rommel estimated that, "up to 85 per cent of our transport still consisted of captured enemy vehicles, and continued to do so even after this time."<sup>121</sup> By the beginning of the battle on 23 October, 33% (4,081 out of 12,194) of the *Deutsches Afrika Korps*' vehicles were of captured origin, while 4% (113 out of 3,139) of the vehicles operated by the Italians were of captured origin.<sup>122</sup>

Rations were also a problem, although the bread supply was sufficient for 21 days (at half rations, 450 grams per man per day), many items—in particular lemons and vegetables were in short supply. Another burden for the men was caused by the partial failure of the water supply system in the forward areas. The inadequate ration situation had affected the health and moral of the soldiers, with an increasing number unavailable for combat due to various illnesses.<sup>123</sup> For example, a single regiment in the 164<sup>th</sup> *Leicht Afrika* Division had about 1,000 men out sick, while the 22<sup>nd</sup> *Fallschirmjager* Brigade had 1,041 sick.<sup>124</sup>

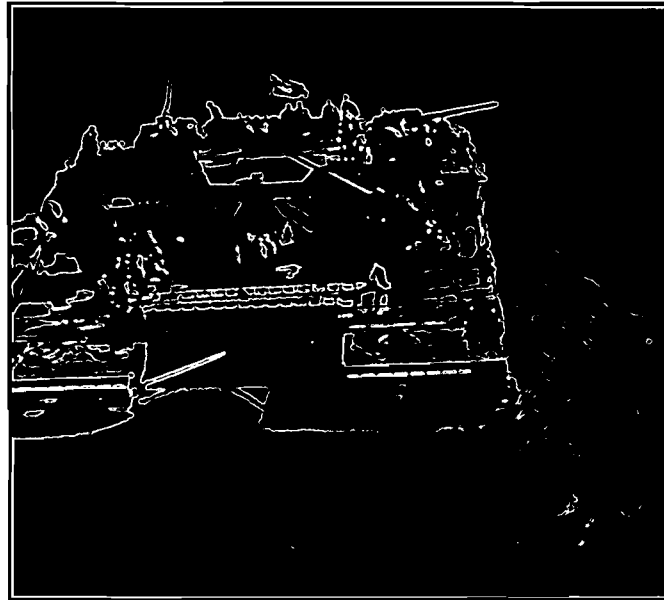
**TABLE 9. AXIS LOGISTIC SHORTFALL**

MONTH	MINIMUM REQUIREMENT	AMOUNT RECEIVED	PERCENT
September	30,000 tons	16,200	54%
October	35,000 tons	71,487	204%
November			26%

**TABLE 10. ITALIAN AMMUNITION STATUS<sup>125</sup>**

TYPE	ON-HAND	REQUIRED	PERCENT
47/32	20,000	210,000	9.5%
8mm	1,000,000	25,000,000	4%
20mm	130,000	560,000	23%

The panzerarmee also desperately needed reinforcements. *Generalfeldmarshall* Rommel estimated that about 11,200 men, 3,200 vehicles (including 120 tanks) and 70 field guns were required to bring his German formations up to their authorized strength. Although about 6,000 men and 1,200 vehicles (including 120 tanks) had been earmarked for Africa, they were still in Germany.<sup>126</sup> Indeed, Hitler had also promised *Generalfeldmarshall* Rommel increased supplies as well as a *Nebelwerfer* (rocket artillery) brigade, a battalion of 40 new Tiger tanks and self-propelled guns. The Germans planned to move much of this using the new Siebel ferries (*Siebelfahren*) that had been designed by Dr. Fritz Siebel. These were initially developed for Operation Sealion (the unexecuted invasions of Britain in the fall of 1940) and were shallow draft vessels that allowed torpedoes to pass underneath without detonating. The pioneers of the 778<sup>th</sup> Pioneer Landing Company (attached to *Hauptmann* Kaiser's 58<sup>th</sup> *Bau* Battalion, see photo 31) were operating three of the vessels.<sup>127</sup> However, these new and powerful weapons would not arrive in North Africa until after the defeat of the panzerarmee at El Alamein and the Allied landings in Morocco and Algeria (Operation Torch).<sup>128</sup>



**PHOTO 31. A Siebel Ferry, This One has been Pressed into Service as a Platform for Flak Guns**

#### **4.7. COMMAND AND CONTROL**

Despite similar severe handicaps in their previous battles, the panzerarmee had frequently defeated the 8<sup>th</sup> Army through superior tactical leadership. However, in the months before the Second Battle of El Alamein, the senior commanders and staff officers of the *Deutsch-Italienischen Panzerarmee* had suffered considerable turmoil due to casualties and illness. By autumn 1942, *Generalfeldmarshall* Rommel had been at the head of his soldiers in the hostile desert for eighteen months without leave. In testament to his outstanding physical condition and willpower, he was the only officer over forty to have lasted this long in North Africa.<sup>129</sup> However, Professor Halster, his doctor, became very concerned during the battle of Alam Halfa as each day he examined the general's swollen liver and observed his constantly inflamed throat. This information soon reached Hitler's headquarters where it was decided that the ailing *generalfeldmarshall* had to take sick leave. Although *Generalfeldmarshall* Rommel had requested that General Heinz Guderian be appointed as his deputy on 21 August, this was refused



because the outspoken Guderian was still on bad terms with Hitler because of disagreements during the invasion of the Soviet Union in 1941.<sup>130</sup> On 16 September, Hitler sent *General der Kavallerie* Georg Stumme to Africa as second-in-command and ordered *Generalfeldmarshall* Rommel home. *General der Kavallerie* Stumme, an experienced panzer commander, was popular with his soldiers and had seen a considerable amount of action on the Russian Front.<sup>i</sup> *Generalfeldmarshall* Rommel briefed him extensively and showed him the correspondence with Rome and Berlin on the needed supplies and reinforcements before the 8<sup>th</sup> Army attacked, which *Generalfeldmarshall* Rommel said he expected with the full moon in October.<sup>131</sup> However, *Generalfeldmarshall* Rommel refused to entrust the battle to him, except on a temporary basis. He planned to return in case of a major offensive by the Allies. Before leaving for Germany, *Generalfeldmarshall* Rommel told *General der Kavallerie* Stumme, “If the battle begins, I shall abandon my cure and return to Africa.” As *Generalfeldmarshall* Rommel stated in his Memoirs: “He was rather put out when he heard that I proposed to cut short my cure and return to North Africa if the Allies opened a major offensive. He supposed that I had no confidence in him...”<sup>ii</sup> Based on his observations, *Generalfeldmarshall* Rommel felt that experience on the Russian front was not particularly helpful in the desert. Nevertheless, he left a week after *General der Kavallerie* Stumme had arrived, departing on a well-deserved leave.

On 22 September, *Generalfeldmarshall* Rommel flew to Derna and continued on to Rome the following day. On the 24<sup>th</sup>, he interrupted his flight to visit Mussolini at his summer residence in Forlì. As *Generalfeldmarshall* Rommel said goodbye to Marshal Cavallero after his conversation with Mussolini, the latter asked: “Can Italy count upon your immediate return if Montgomery attacks?” At this point, *Generalfeldmarshall* Rommel indicated that he could return to North Africa in eight hours.<sup>132</sup>

*Generalfeldmarshall* Kesselring found *General der Kavallerie* Georg Stumme to be a man of “a more even and genial temper than Rommel, he did much to relax the tension among officers and men, besides managing to create tolerable relations with the Italian Command.”<sup>133</sup> The fifty-five year old general, looking the every bit the part of the traditional Prussian general, worked vigorously to improve the defenses of his panzerarmee. He flew and drove all along the front encouraging his troops and attempting to live up to his old Russian Front nickname of “fireball.” However, some of the German troops were unimpressed by this stand-in for their beloved “Desert Fox.” *General der Kavallerie* Stumme’s jocular familiarity with the troops and his habit of gesticulating when speaking soon earned him a new nickname among the veterans of the *Afrika Korps*, “the Italian.”<sup>134</sup>

Regrettably for *General der Kavallerie* Stumme, he inherited a command and staff structure that had seen better days. Of his corps commanders, the previous commander of the *Deutsches Afrika Korps*, *Generalleutnant* Nehring had been wounded on 30 August and was replaced by *General der Panzertruppe* Ritter von Thoma. *General der Panzertruppe* von Thoma had arrived on 20 September from the Russian front, just two days prior to *Generalfeldmarshall* Rommel’s departure. He was considered to be one of the “founding fathers” of the *Panzerwaffe*, having commanded a panzer regiment in the Spanish Civil War. Since then, he had commanded the panzer brigade of the 2<sup>nd</sup> Panzer Division during the Polish Campaign in 1939 and the 17<sup>th</sup> Panzer Division under General Guderian’s 2<sup>nd</sup> *Panzergruppe* during the invasion of the Soviet Union in 1941.<sup>135</sup> In the *Deutsch-Italienischen Panzerarmee*’s other motorized corps, the Italian XX Motorized Corps, Lieutenant-General Guiseppe Stephanis had been in command since June, when he had replaced General Baldassare. He was now *General der Kavallerie* Stumme’s most experienced corps commander, with less than four months under his belt. A mine had killed General Orsi, the previous commander of the Italian X Corps, on 18 October, leaving Lieutenant-General

<sup>i</sup> *General der Kavallerie* Georg Stumme had been in command of XL Panzer Corps with Army Group Center on the Russian Front in the summer of 1942 when one of his staff officers was captured by the Soviets. Contrary to direct orders from Hitler, the staff officer was carrying an important operations order that contained a detailed overview of German intentions. As a result, *General der Kavallerie* Stumme was convicted of disobeying an order by the Reich War Tribunal and sentenced to five years imprisonment. At *Reichsmarschall* Hermann Goring’s instigation, he was pardoned and sent to North Africa. See *Erinnerungen*, by Siegfried Westphal, Hase & Koehler Verlag, Mainz, 1975, page 174 and *Rommel, A Narrative & Pictorial History*, page 180.

<sup>ii</sup> *The Rommel Papers*, page 293 & 300. *Oberst* Fritz Bayerlein, *Generalfeldmarshall* Rommel’s Chief of Staff has pointed out that “It has been repeatedly stated by different writers that Gen. Stumme did not plan the defenses at El Alamein in the way that Rommel would have done. To this it must be clearly stated that Rommel issued orders for the construction of the defenses before his departure from Africa, and that Stumme merely executed them.” Author’s note: This does not appear to be entirely true, although *General der Kavallerie* Stumme apparently established the defenses according to the plan of the *Generalfeldmarshall*, he did not follow his intent when the battle began as *General der Kavallerie* Stumme withheld his artillery fire while the allies were penetrating his forward minefields and he waited to launch his counterattacks until those could be massed and coordinated.



Enrico Frattini (commanding general of the *Folgore* Airborne Division) as acting corps commander (pending the arrival of Lieutenant-General Edoardo Nebba). The XXI Italian Corps was under the temporary command of General Gloria (commanding general of the *Bologna* Division), pending the arrival of Lieutenant-General Enea Navarini. (See Appendix I, Axis Order of Battle).

The situation with the division commanders was just as serious. Two of the three commanders of *General der Kavallerie* Stumme's veteran German divisions (21<sup>st</sup> Panzer and the 90<sup>th</sup> *Leicht Afrika*) were new to their jobs, with less than two months experience. The third (*Generalmajor* Gustav von Vaerst of the 15<sup>th</sup> Panzer) had just returned from convalescence leave for a wound suffered in May. *Generalmajor* Heinz von Randow had just arrived to replace *Generalmajor* Georg von Bismarck as the commander of the 21<sup>st</sup> Panzer Division, who had been killed by a mine on 1 September. *Generalmajor* Theodor von Sponeck had replaced *Generalmajor* von Kleeman (at the 90<sup>th</sup> *Leicht Afrika* Division) who had also been wounded on 1 September. With the arrival of *Generalmajor* von Randow at 21<sup>st</sup> Panzer Division, *Generalmajor* Karl Lungerhausen (who had been in temporary command for most of September) was able to return to his newly arrived 164<sup>th</sup> *Leicht Afrika* Division. Three of the eight Italian divisions, including the veteran *Ariete* Armored Division, had also received new commanders within the last month (the others were the *Brescia* and *Trento* divisions). The losses among the more junior leadership (non-commissioned officers as well as company and field grade officers) was also significant (although much more difficult to document and quantify, see Appendix I, Order of Battle), indeed, many companies in the 164<sup>th</sup> *Leicht Afrika* Division were commanded by non-commissioned officers.<sup>136</sup> The erosion of the leadership made it more difficult, in the German formations, to fight according to the mission tactics (*Auftragstaktik*)<sup>i</sup> that *Generalfeldmarshall* Rommel had inculcated so effectively into the *Afrika Korps*.<sup>137</sup>

Another facet of German military philosophy which enabled them to frequently “operate within the decision making cycle of their opponents” was the fact that their headquarters staffs were much smaller than their western counterparts, as alluded to by Major Sillavengo earlier in his description of *Oberst* Hecker's headquarters. Indeed, the immediate general staff sections of the German panzer division contained only seven staff officers (3 majors, 4 captains) in contrast to a modern US Marine Corps division staff of 30 officers (1 brigadier general, 6 colonels, 11 lieutenant-colonels, 11 majors and 7 captains). In fact, the staff of a panzer division was smaller than the staff of a modern US Marine Corps infantry battalion with 12 officers (2 majors, 5 captains, and 5 lieutenants). When properly trained and staffed, the German system of command was very responsive. Indeed, during the North African campaign, *Generalfeldmarshall* Rommel rarely issued written orders, preferring, instead to issue verbal orders with overlays.<sup>138</sup> Therefore, the success of his operations relied heavily on the initiative and expertise of his junior officers.<sup>139</sup> However, like *General der Kavallerie* Stumme's commanders, the staff at the panzerarmee had also seen considerable turnover recently. *Generalfeldmarshall* Rommel wrote to his wife on 9 September that, “Now Gause (the experienced Chief-of-Staff) is unfit for tropical service and has to go away for six months. Things are also not looking too good with Westphal (Ia), he's got liver trouble (jaundice). Lieut. -Col. von Mellenthin (Ic) is leaving to-day with amoebic dysentery. One of the divisional commanders was wounded yesterday, so that every divisional and the Corps Commander have been changed inside ten days.”<sup>140</sup> *Oberst* Westphal, who continued to serve despite his illness, assumed the role of acting Chief of Staff for the panzerarmee. noted, “Aside from the senior quartermaster and his assistant, both of who's battle stations were well to the rear, and a still green 4<sup>th</sup> general staff officer, I was now the sole general staff officer on the Army staff with African experience. Gause and Mellenthin, with whom I had formed a particularly close relationship, had returned to Europe. Into von Mellenthin's place had stepped *Oberstleutnant* Zollig. He was good, as he later proved to me in Italy and the west. We stayed together until the end of the war. I have never seen a better worker on the enemy situation. We were only a few men, other than a distinguished ordnance officer, I was alone on the field.”<sup>141</sup>

In addition to the turbulence among the leadership, the complex relationships between the panzerarmee, *Generalfeldmarshall* Kesselring (Commander-in-Chief South (*Oberbefehlshaber Sud*)),<sup>ii</sup> the German High

<sup>i</sup> Author's note: *Auftragstaktik* was a term developed after the war to describe this German leadership philosophy, it is generally translated as 'mission tactics' in the west.

<sup>ii</sup> Since August 1942, *Generalfeldmarshall* Rommel had been made directly responsible to *Commando Supremo* for operations. Consequently, *Generalfeldmarshall* Rommel was not under the orders of *Generalfeldmarshall* Albert Kesselring, who had been appointed Commander-in-Chief South (*Oberbefehlshaber, Sud*) toward the end of 1941. *Generalfeldmarshall* Kesselring was tasked with establishing air and naval superiority in the central Mediterranean. He was subordinate to Mussolini and had a mixed German/Italian staff. To accomplish his mission, he had the II and X *fliegerkorps* as well as operational control of certain Axis naval units. In addition, he was directed to cooperate with *Generalfeldmarshall*



Command (OKW), and the Italian *Commando Supremo* further complicated problems of command and control. Indeed, after the destruction of the *Sabratha* Division in July, Mussolini gave into political pressure and directed that Italian troops had to be led by their own commanders. As a result, the panzerarmee was forced to address its orders jointly to the German and Italian commanders in a *kampfgruppe*. However, this system worked better than might be expected, for it seems that in practice the Germans made the decisions on which they and the Italians then acted (Sketch 2). Nevertheless, the Italians were under no obligation to do so, and in any case such an arrangement certainly required more precious time during a battle to coordinate than usual.<sup>142</sup> Another source of difficulty for the panzerarmee was the need to integrate the Italians and their obsolete radio equipment into their operations. This situation was further complicated by *Generalfeldmarshall* Rommel's decision to corset the Italian and German formations together, as this increased the distance between battalions and their controlling regimental and divisional headquarters.<sup>143</sup>

In addition, as stated earlier, General Montgomery had managed to deceive the leaders of the Axis forces. He had cunningly created an intelligence cell for his southern front, the reports of which were designed purely for the Axis radio intercept units. Moreover, he had a pipeline, with fueling stations and petrol dumps, built slowly, very slowly, so that the Axis intelligence would form the opinion that it would take another four weeks at the least before he was ready. He deceived the staff of the panzerarmee so cleverly that even the arrival of two new divisions with two hundred and forty guns and a hundred and fifty tanks had taken place unobserved.<sup>144</sup>

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<sup>3</sup> *North Africa, 1940-1943, Appendixes, Landmine and Countermine Warfare*, Engineer Agency for Resources Inventories, Washington, D.C., June 1972, page ii.

<sup>4</sup> *The Trail of the Fox, The Search for the True Field Marshal Rommel*, by David Irving, Thomas Congdon Books, New York, 1977, page 315.

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<sup>6</sup> *Foxes of The Desert, The Story of the Afrika Korps*, by Paul Carell, Schiffer Military History, Atglen, Pennsylvania, 1994, page 272. See also "El Alamein," by Fritz Bayerlein, in *The Fatal Decisions*, edited by Seymour Freiden and William Richardson, Berkley Publishing Corp., New York, 1973, pages 107-108.

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<sup>13</sup> *Alam Halfa and Alamein*, pages 196-200.

<sup>14</sup> *The Rommel Papers*, page 300.

<sup>15</sup> *Kriegstagebuch, Deutsch-Italienischen Panzerarmee*, US National Archives, Captured German Records Division, Series T-313, Roll 467, 1<sup>st</sup> frame 8,765,457.

<sup>16</sup> *Erinnerungen*, by Siegfried Westphal, Hase and Koehler Verlag, Mainz, 1975, page 172.

<sup>17</sup> *Tobruk and El Alamein*, by Barton Maughan, Australian War Memorial, Canberra, page 642.

<sup>18</sup> *The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV*, by I. S. O. Playfair and C. J. C. Molony with F. C. Flynn and T. P. Gleave, Her Majesty's Stationery Office, London, 1966, page 10.

<sup>19</sup> *North Africa, 1940-1943, Landmine and Countermine Warfare*, Engineer Agency for Resources Inventories, Washington, D. C., June 1972, page 259.

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Rommel in North Africa. See *The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV*, by I. S. O. Playfair and C. J. C. Molony with F. C. Flynn and T. P. Gleave, Her Majesty's Stationery Office, London, 1966, page 24 and *Kesselring, A Soldier's Record*, by Albert Kesselring, William Morrow & company, New York, 1954, page 154.

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## 5. ALLIED TACTICAL PREPARATIONS FOR BATTLE

### 5.1. MANEUVER

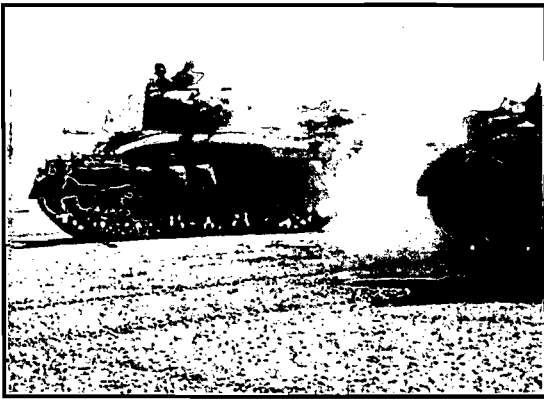
After stopping the *Deutsches Afrika Korps* at Alam Halfa at the beginning of September, General Montgomery decided to attempt no immediate counterattacks.<sup>1</sup> Unlike his predecessors, he would take no chances at all against the wily “Desert Fox.” Slowly, deliberately, and despite significant pressure for greater haste from London, General Montgomery began systematically massing his forces to an overwhelming level. He might be overcautious, but he was not going to give *Generalfeldmarschall* Rommel the opportunity to pull off another one of his miracles, even if it meant bypassing a potentially decisive victory himself.<sup>2</sup>

By late October, General Montgomery had amassed a significant numerical superiority over the *panzerarmee* in all critical categories (Table 11, see also appendices I and J for the Axis and Allied Orders of Battle). In addition, much of the previous German technical edge had eroded. The 8<sup>th</sup> Army outnumbered *Deutsch-Italienischen Panzerarmee* 220,476 to 104,000 (of whom only about 50,000 were the better equipped and led German troops and of these, only about 35,000 were combat troops). Of all the weapon systems employed by both sides during the North African campaign, the medium tank was the dominant weapon. In this critical category, the Allies had 1,378 tanks available for the initial attacks. Of these, at least 669 were suitable for combat with the best German types, including 318 M4 Shermans, 246 M3 Grants, and 105 Crusader MK IIIs (armed with the new 57mm gun called a “6-pounder”). The rest of the tanks available to the 8<sup>th</sup> Army were considered to be second rate because they were under-gunned compared to their likely German opponents. This group consisted of 167 M3 Stuarts (called “Honey” by the British), 223 Valentines with a 40mm gun (called a “2-pounder”), 6 new Churchill Tanks (armed with a 2-pounder) and 316 earlier models of the Crusader. Of the total of 421 Crusaders, the earlier models were either MK IIs (255) with a “2-pounder” or Crusader CS (Close Support) (35) with a 3-inch (76mm) close support howitzer. (Photos 32-37). The American-built Sherman and Grant tanks were both armed with a 31-caliber 75mm medium velocity gun. However, the Grant had the disadvantage of having its 75mm gun located in a sponson on the right side of the vehicle, thus restricting its field of fire. This shortcoming was partially offset by the inclusion of a 37mm gun in the turret. Although the 8<sup>th</sup> Army considered the Sherman to be a promising design, it was, as yet, unproven in battle. These figures on the available tank strength do not include an additional 1,200 tanks that were either in reserve or new arrivals being outfitted in the workshops. Opposing them were about 500 Axis tanks and assault guns that were desperately short of fuel and ammunition. Of these, the Germans had 223 medium tanks, only 30 of which were Panzer IV Specials armed with the lethal 42-caliber, 75mm main gun. The Italians had 278 obsolescent M14 medium tanks (called “self-propelled, iron coffins” by their crews) and 35 Semovente assault guns (with a 75mm low velocity howitzer). The *panzerarmee* also had about 70 light tanks, but these were only suitable for reconnaissance and screening missions.

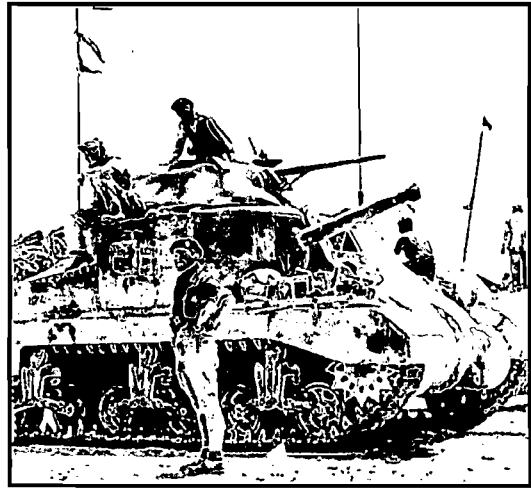
In the area of artillery, the Allies had 908 field and medium artillery pieces available with plenty of ammunition compared to 677 on the Axis side (273 German and 404 Italian) with limited ammunition. The Allies also had 1,435 antitank guns (including 849 6-pounders (a small number of which were mounted on a 4-wheeled chassis and called a “Deacon”) and 554 2-pounders) not including those in reserve or in the shop. The Axis had between 522 and 744 antitank guns available. Of these, between 341 and 444 were German (including 68 captured Russian 76.2mm antitank guns and 290 5 cm Pak 38, the rest were primarily obsolescent 3.7cm Pak 36), while the Italians had between 150 and 381 of the 47/32 Breda antitank guns (Photo 2). Mention must also be made of the 86 famous 88mm dual-purpose antiaircraft/antitank guns (see Photo 1, at least 36 of which were manned by Italian crews) as well as 8 of the equally lethal, Italian 90/53-dual-purpose, antiaircraft/antitank guns. Luftwaffe personnel from the XIX Luftwaffe Flak Division manned most of the German 88’s. However, many of the 88’s were deployed in an antiaircraft role away from the front and thus were not available for use as antitank guns (see appendices I and J for Axis and Allied Orders of Battle; and tables 12-14). An additional fifty-two 88’s were deployed in the deep rear area to provide antiaircraft protection.<sup>3</sup>

**TABLE 11. OPPOSING STRENGTHS AT EL ALAMEIN**

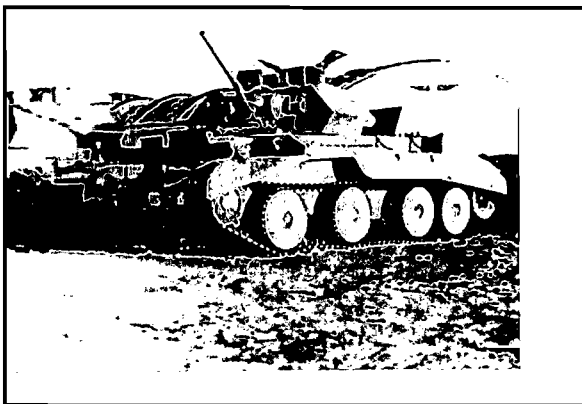
CATEGORY	Deutsch-Italienischen Panzerarmee			EIGHTH ARMY	RATIO	RATIO
	GERMAN	ITALIAN	TOTAL	TOTAL	(Allies vs. Axis)	(Allies vs. German)
Men	50,000	54,000	104,000	231,000	2 to 1	4 to 1
Engineers	1,300	2,430	3,730	3,445	1 to 1	3 to 1
Medium Tanks & Assault Guns	223	314	537	1,136	2 to 1	5 to 1
Artillery	273	404	677	908	1 to 1	3 to 1
Antitank Guns	341	381	650	1,435	2 to 1	4 to 1
Aircraft	275	400	675	750	1 to 1	3 to 1
Serviceable Aircraft	150	200	350	530	2 to 1	4 to 1



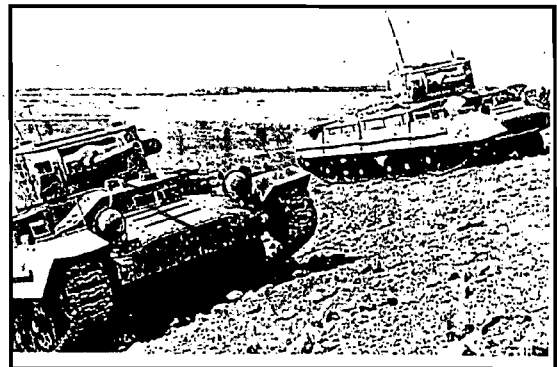
**PHOTO 32. US Built Sherman (318 on-hand)**



**PHOTO 33. US Built Grant (246 on-hand)**



**PHOTO 34. Crusader (421 on-hand)**



**PHOTO 35. Valentine (223 on-hand)**



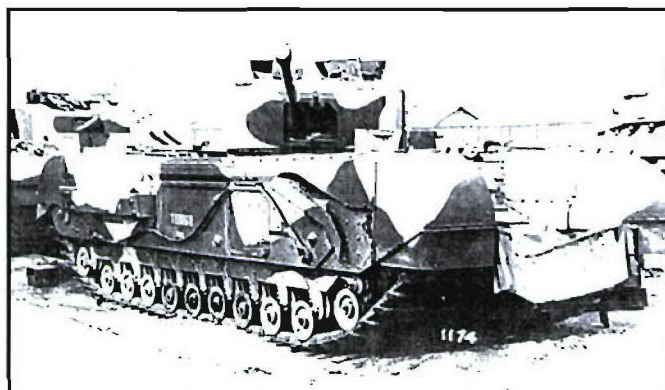


PHOTO 36. Churchill (6 on-hand)

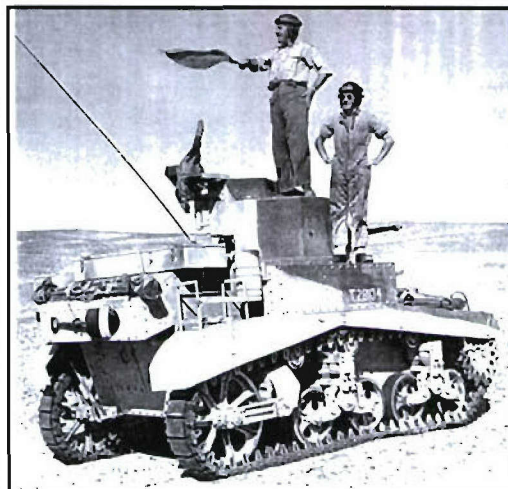


PHOTO 37. US Built Stuart (Called the "Honey" by the 8<sup>th</sup> Army, 167 on-hand)

TABLE 14. ACCURACY OF SOME AXIS AND ALLIED ARMOR-PIERCING GUN SYSTEMS<sup>i</sup>

Weapon	Origin	Muzzle Velocity (meters per sec)	100m* (%)	500m (%)	1000m (%)	1500m (%)	2000m (%)	2500m (%)	3000m (%)
2-Pounder	UK	792	100 (100)	97 (67)	67 (26)	41 (12)			
25-Pounder	UK	472	100 (100)	94 (66)	81 (46)	69 (28)			
3.7cm Pak L/45	Ger	758	100 (100)	100 (95)	90 (47)	47 (15)			
4.7cm Pak	Ger	775	100 (100)	100 (100)	100 (89)	94 (57)			
5cm KwK L/42	Ger	685	100 (100)	100 (100)	100 (96)	99 (71)			
5cm Pak L/60	Ger	835	100 (100)	100 (100)	100 (95)	98 (68)			
7.5cm KwK L/24	Ger	385	100 (100)	100 (100)	98 (73)	74 (38)			
8.8cm Flak L/56	Ger	810	100 (100)	100 (98)	95 (64)	77 (38)	58 (23)	43 (15)	32 (10)
10.5cm leFH L/28	Ger	395	100 (100)	100 (98)	97 (63)	76 (32)			
47/32 Mod. 35	It	630	100 (100)	100 (95)	91 (46)	53 (17)			
47/32 Mod. 39	It	630	100 (100)	100 (95)	93 (52)				

<sup>i</sup>The accuracy is the probability of hitting a stationary 2x2.5 meter target from a stationary position. The first number is from controlled test firings, the second number (in parenthesis) is based on the dispersion and closely approximates the accuracy obtained by troops on a range or (if they remain calm) in combat.

In addition, the 8<sup>th</sup> Army had 500 armored cars, of which 188 were Humbers, 96 Daimlers, 212 Marmon-Harringtons and 4 AECs. Of the total available, 382 were with the seven armored car regiments, 58 were with various headquarters units and 65 were in reserve, transit, maintenance, etc.<sup>4</sup> Against them, the Axis had 42 armored cars and about 70 light tanks. Many of these armored cars were on detached service, screening the *panzerarmee*'s southern flank.<sup>5</sup> Also, the 8<sup>th</sup> Army was authorized about 2245 universal carriers (small armored personnel carriers), 256 per infantry division and 151 per armored division. However, it is un-clear how many were actually on hand for Operation Lightfoot.

<sup>i</sup> See Tank Combat in North Africa, The Opening Rounds, Operations Sonnenblume, Brevity, Skorpion and Battleaxe, February 1941-June 1942, by Thomas L. Jentz, Schiffer Military History, Atglen, Pennsylvania, 1998, pages 57-59, for a detailed description of how these numbers are derived. Of note is the fact that it is assumed the gunner knows the range to the target accurately. Due to many factors, the first round hit probability in combat is much lower than this. When attempting to fire on the move, as the British taught their tank crews, the probability of a hit drop of significantly. When moving at 10 mph and firing broadside against an 8 by 8 foot target at 650 yards the probability of a hit (based on a very small test sample) was found to be about 21%, about 33% at 15 mph, and about 33% at 20 mph. The Germans and Italians taught their tank crews to fire from the halt.

General Montgomery faced the coming battle with confident determination. He had decided to force a World War I-type attrition battle with the mental attitude necessary to win. Whatever it cost in men and material was the price he would pay for victory. The bill might be higher than even he expected, but he would pay it just the same.<sup>6</sup>

As his build up progressed through mid September and after examining the situation, General Montgomery stated that, “*Next, a full moon was necessary. The minefield problem was such that the troops must be able to see what they are doing. A waning moon was not acceptable since I envisaged a real “dog-fight” for at least a week before we finally broke out; a waxing moon was essential. This limited the choice to one definite period each month. Owing to the delay caused to our preparations by Rommel’s attack, we could not be ready for the September moon and be sure of success.*”<sup>7</sup> The next full moon was on 24 October. After considering the amount of training the 8<sup>th</sup> Army required to be ready and the need to conduct the breach at night, General Montgomery set the date of the attack for 23 October. In the meantime, the soldiers of the 8<sup>th</sup> Army were to be thoroughly rehearsed and trained for their missions. General Montgomery took every effort to ensure that his soldiers were as well prepared for the coming offensive as humanly possible. His demands for men, equipment, and supplies were satisfied in every particular. He and General Alexander, his commander-in-Chief, resisted all pressure from London to make the attack sooner. Even the prodding of Prime Minister Churchill was firmly, though diplomatically, rebuffed. In fact, General Montgomery told General Alexander that if the attack were ordered for September, they would have to find someone else for the job.<sup>8</sup>

As one of the official histories pointed out, “*Another consideration that affected the timing of the 8<sup>th</sup> Army’s attack was that the Allied invasion of French North Africa (Operation Torch) was scheduled to begin on 8 November. It was desirable that there should be a decisive victory over the Axis forces at El Alamein just before the American invasion so as to impress the people of French North Africa and the (pro-German) Fascist Spanish dictator, General Franco.*”<sup>9</sup> In addition, there was national pride at stake. The British leadership appears to have wanted to win a major victory over the Germans before the Americans had a chance to decisively intervene.

The lack of an open flank at El Alamein forced the 8<sup>th</sup> Army to consider breaching the heavily mined, deep defensive zone that had been specifically designed by *Generalfeldmarshall* Rommel to defeat an armored attack. General Montgomery recognized that his armored force could not breakthrough this zone without prohibitive casualties. He also recognized that the *panzerarmee*’s defenses, which lacked adequate infantry to fully man them, might be vulnerable to a dismounted infantry attack. Based on this, General Montgomery decided that he would attempt to exploit this apparent weakness by opening breaches in the *panzerarmee*’s main line of resistance by leading his attack with dismounted infantry. In addition, General Montgomery’s initial plan for the offensive differed from the usual desert attack in that the main blow would fall in the north, not around an open flank to the south. A successful breakthrough along the coast road promised to isolate most of the *panzerarmee*’s foot bound infantry formations in the deep desert to the south. General Montgomery decided that Lieutenant General Sir Oliver Leese’s XXX Corps, with four of its infantry divisions, was to cut two corridors through the deep minefields and breakthrough the *panzerarmee*’s main defensive line. Then Lieutenant General Herbert Lumsden’s X Corps would pour through the breaches with all of its armor, occupy positions deep in the *panzerarmee*’s rear, and thus dominate their lines of supply and communications.<sup>1</sup> The panzer divisions then would be forced to attack the bulk of General Lumsden’s armor under unfavorable circumstances, on ground of General Montgomery’s choosing.<sup>10</sup> After the destruction of *Generalfeldmarshall* Rommel’s panzers, General Montgomery’s armor could then resume the advance, spread out, and begin the pursuit of the (it was hoped) retreating Axis forces. Thus, General Montgomery’s trump card lay in attacking the *panzerarmee* at one of its strongest points instead of at its weakest. According to expectations, he should have launched his main assault in the south. But he planned to attack in the north, in the very spot where the pioneers of the 164<sup>th</sup> *Leicht Afrika* Division had for weeks on end been laying the “Devil’s Gardens.”<sup>11</sup>

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<sup>1</sup> While in command of the 1<sup>st</sup> Armoured Division in 1941, General Lumsden had been wounded by a mine.



**TABLE 12. MAXIMUM RANGE OF PENETRATION, AXIS ANTI-TANK GUNS VERSUS ALLIED TANKS**

Tank	Aspect	200 yds	300 yds	400 yds	500 yds	600 yds	700 yds	800 yds	900 yds	1000 yds	1100 yds	1200 yds	1300 yds	1400 yds	1500 yds	1600 yds	1700 yds	1800 yds	1900 yds	2000 yds	2500 yds	3000 yds
Sherman II (M4A1)	Front		75/24	37				50/42		50/60											76.2	88
	Side			37								75/24			50/42	50/60					75/42	90
Grant	Front		75/24	37				50/42		50/60											76.2	88
	Side			37								75/24			50/42	50/60					75/42	90
Crusader	Front	37			47	75/24						50/42			50/60						75/42	76.2
	Side						37										75/42					90
Valentine	Front		50/42		50/60							76.2										88
	Side	37				75/24						50/42			50/60						75/42	90
Stuart	Front			37								75/24			50/42	50/60					75/42	76.2
	Side							37							50/42	50/60					75/42	88
																					75/42	90

Background: 1) Based on standard APHE or APCBCHE, 2) Assumes 30-degree angle of impact on armor of average thickness. Information from Afrika Korps at War, 1 ~ The Road to Alexandria, by George Forty, Ian Allan Ltd, London, Pages 48-49.

**TABLE 13. MAXIMUM RANGE OF PENETRATION, ALLIED ANTI-TANK GUNS VERSUS AXIS TANKS**

Tank	Aspect	100 yds	200 yds	300 yds	400 yds	500 yds	600 yds	700 yds	800 yds	900 yds	1000 yds	1100 yds	1200 yds	1300 yds	1400 yds	1500 yds	1600 yds	2000 yds	2300 yds	2400 yds	2500 yds	3000 yds
Pz IV	Front			40		37			57					87				75				
	Side									40		37						57				
Pz IIIj	Front							57								75						
	Side																40		37			
Pz III	Front			40		37			57					87				75				
	Side																40		37			
M14	Front															57						
	Side																					

Background: 1) Based on standard AP or APCBC, 2) Assumes 30-degree angle of impact on armor of average thickness. Information from Afrika Korps at War, 1 ~ The Road to Alexandria, by George Forty, Ian Allan Ltd, London, Pages 48-49.

Question 4: What is the probability of a hit against a tank size target as a function of weapon type and range?



Two weeks after his victory at Alam Halfa, General Montgomery published his initial operations order for 'Operation Lightfoot' on 14 September, almost six weeks before the attack (see Appendix B for the base order). However, as he became more familiar with the capabilities of the units at his disposal, General Montgomery was forced to modify this plan. By 6 October, he had concluded that his plan was too ambitious for the state of training of the various units of XXX and X Corps, particularly the armored units. So, instead of ordering XXX Corps to breach the entire depth of the *panzerarmee's* defensive zone, to be followed by an aggressive move against their panzers by X Corps, the plan was changed so as to be more limited in scope. In the final plan, four of the five infantry divisions from XXX Corps would cut two corridors through the minefields and the first layer of the *panzerarmee's* defenses, and then establish a "bridgehead" along Phase Line Oxalic. This was expected to result in the capture of the *panzerarmee's* main defensive line and gun areas in the zone of attack.<sup>i</sup> In the redesigned plan, the operations of XXX Corps were intended to result in the armored divisions of X Corps being able to pass unopposed through the breaches made in the Axis minefields and reach Phase Line Pierson. General Montgomery stated that it was "essential for the success of the whole operation" that the leading armor brigades be ready at dawn on Phase Line Pierson. This revised plan for "Operation Lightfoot" was designed to fix the *panzerarmee's* foot bound, forward-deployed infantry formations in the northern sector in their present positions and then slowly destroy them there.<sup>ii</sup> This was to be accomplished by XXX Corps "crumbling" the defenses through a series of systematic attacks on the entrenched Axis infantry. While this was being accomplished, the fixed Axis infantry would serve as "bait" to attract the *panzerarmee's* armor formations to their rescue. To defeat these expected counterattacks, the tanks of X Corps were expected to assume a defensive posture forward of XXX Corps and wait for the *panzerarmee* to come to them. After the *panzerarmee* had spent itself in its habitual counterattacks, any small elements escaping to the west would be pursued and dealt. In this manner, General Montgomery intended to turn the predictable and violent German counterattacks, which had been so successful in the past, against them. With the *panzerarmee's* infantry reduced, there would no longer be a secure base from which the panzers could operate, thus placing the panzers at a disadvantage for once.<sup>12</sup> This plan could succeed if the Italian infantry battalions in the main line of resistance were routed or destroyed, leaving the forward German infantry battalions encircled but intact. This would bait the trap for the panzers. However, if the *panzerarmee's* infantry withdrew or managed to hold their positions in the main defensive area, there would be no "bait" and, hence, no "crumbling."<sup>13</sup>

In support of XXX Corps' attack, the corps' 4<sup>th</sup> Indian Division was tasked with mounting a diversionary attack near Ruweisat Ridge toward Deir El Shein. It was to be little more than a quick raid and noisy demonstration. It was intended to fix the Italians of the 25<sup>th</sup> Bologna Division in place and distract the *panzerarmee's* leadership from the main attack further north. As a final diversionary touch, a demonstration portraying an amphibious landing was planned to take place on the coast behind the *panzerarmee's* lines, on the night of 23 October, about three hours after the start of the main attack. This demonstration was intended to keep the *panzerarmee's* reserve divisions (the 90<sup>th</sup> *Leicht Afrika* Division and the Trieste Motorized Division) distracted from the main effort for a while. To support the deception, dummy tanks and 800 personnel (from various rear area units stationed near the port) were to be loaded onto four transport ships in Alexandria harbor with sufficiently lax security to ensure that word of it would get back to the *panzerarmee*. However, after leaving the harbor in conspicuous fashion, the bulk of the force was to slip back in the darkness and secretly disembark. Meanwhile, three fast motor torpedo boats, each towing a barge loaded with smoke canisters, were to proceed to the landing area at El Daba (about 27 kilometers behind the *panzerarmee's* lines) and deploy a smoke screen while firing on the dummy landing area to draw the attention of the reserves.<sup>14</sup> Another feature that was intended to make this seaborne demonstration even more convincing was that the 9<sup>th</sup> Australian Division would launch their attack along the coast road, close to the sea, in the direction of these "landings."<sup>15</sup>

Meanwhile, just north of the Qattara Depression, General Brian Horrocks' XIII Corps would launch its heavy supporting attacks. One attack was directed against the high ground known as the Qaret el Himeimat and the other toward the Djebel Kalakh. These attacks were expected to engage at least three Italian infantry divisions and, it was hoped, generate sufficient trouble to prevent them and the 21<sup>st</sup> Panzer and *Ariete* Armored divisions from disengaging to go north and aid in the defense against the 8<sup>th</sup> Army's main effort, XXX Corps. However, the attacks

<sup>i</sup> Oddly enough, it would appear that General Leese did not designate which division was the main effort for XXX Corps during Operation Lightfoot. Question 1: Which division is the XXX Corps main effort during Operation Lightfoot? (It appears to be the 2<sup>nd</sup> New Zealand Division)

<sup>ii</sup> The term General Montgomery actually used was "trap," the term "fix" seems to be the closest current US equivalent.

by XIII Corps had to be carefully balanced. They had to appear serious enough to the Axis to be taken as a genuine threat to their southern flank but not so serious as to cause significant casualties among the attacking troops. These forces had to remain in good fighting condition because General Montgomery planned to use them to reinforce the main attack in the north later in the operation.<sup>16</sup>

It should be noted that Operation Lightfoot had no armored reserve to speak of, every armored unit was committed. However, General Montgomery did retain three infantry brigades (the 5<sup>th</sup> Indian, 132<sup>nd</sup> Infantry, and the 2<sup>nd</sup> Free French) in reserve. In addition, six infantry brigades (24<sup>th</sup> Australian, 7<sup>th</sup> Infantry, 161<sup>st</sup> Infantry, 1<sup>st</sup> Greek, 151<sup>st</sup> Infantry, and 69<sup>th</sup> Infantry) had only defensive, “holding” tasks and could be made available, if the situation warranted it.<sup>17</sup> His remarkable knowledge of the *panzerarmee*’s situation was one of the key reasons that General Montgomery felt that he could get away with such a limited reserve.

## 5.2. INTELLIGENCE/COUNTERINTELLIGENCE

“Ultra” was the code name of the British intelligence section that, unknown to the Germans, had ‘cracked’ the ‘unbreakable’ Enigma Code, which was used to encrypt their high level radio transmissions. As a result, General Montgomery knew the *panzerarmee*’s current battle plan as well as its strengths, weaknesses and dispositions. Through Ultra, the Allies were able to learn the cargo, departure and destination information on Axis shipping. Aircraft flying from Malta were then able to target and sink much of the *panzerarmee*’s critically needed supplies (see Axis Logistics Preparations, paragraph 4.6.). As stated earlier, in October, 44% of Axis shipping was lost.<sup>18</sup>

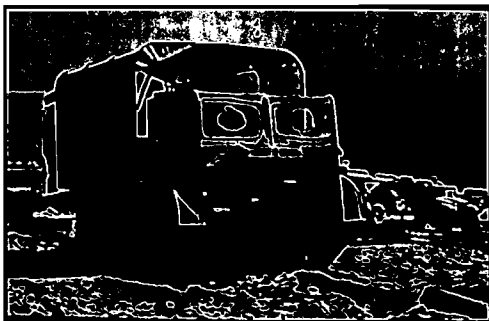
Another useful source was aerial photography, which yielded much useful information. However, only personal reconnaissance could acquire the detailed obstacle intelligence that the sappers needed to know for their breaching parties. As it was very difficult for patrols to explore any but the foremost minefields, it was hard for the commanders to estimate whether the mines as a whole would turn out to be a nuisance –no doubt a big one-or whether they would paralyze the battle.<sup>19</sup>

In the realm of counterintelligence, General Montgomery felt that deception operations had a critical part to play in Operation Lightfoot. Although General Montgomery believed that strategic surprise was unattainable, since the Axis knew the 8<sup>th</sup> Army was going to attack, he judged that it was quite possible to achieve tactical surprise. He intended to deceive the Axis as to the weight, the date, the time, and the direction of the attack. All plans were made with this in mind.<sup>20</sup>

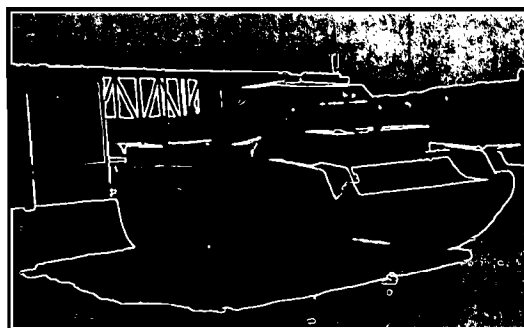
The first challenge for the deception effort was to conceal the 8<sup>th</sup> Army’s equipment concentrations as much as possible from the Axis. The 8<sup>th</sup> Army staff worked out their subordinate units’ complete layout on the day of the attack – the number and location of guns, tanks, vehicles, and troops. A very large “operations” map was kept which showed this layout in various denominations. The staff then arranged to reach the required density as early as possible, and to maintain it up to the last moment so that the Axis’ aerial reconnaissance would show no particular change during the last two or three weeks before the attack. To achieve this, the 8<sup>th</sup> Army used spare trucks and decoys. They had about 4,000 special dummy vehicles fabricated by the army’s workshops under which guns and vehicles could be concealed (photos 38 to 40).<sup>i</sup> The assault units gradually replaced these spares and dummies as they moved into their assembly areas. In addition, slit trenches were dug and camouflaged to conceal the presence of the assault infantry as they moved into position. By 6 October, the correct number of vehicles (drawn from XIII and XXX corps) and dummies were in place. However, there were some anxious moments on 16 and 17 October when high winds wrecked many of the decoys, but the soldiers were able to make repairs before the Axis was able to detect the ruse. All moves forward were, of course, tightly controlled, and executed at night.<sup>21</sup>

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<sup>i</sup> The Germans had also used decoys before. One of General Rommel’s first orders upon his arrival in North Africa was for *Oberstleutnant* Hundt, his senior staff engineer at the time, to organize the construction of decoys to fit on Volkswagens. General Rommel intended to make his initial force (in February and March 1941) look larger than it was. Indeed, to make his first attack appear larger, General Rommel also directed that aircraft engines be strapped to the beds of trucks and used to raise the massive dust clouds typical of large tactical movements across the desert. See *Alam Halfa and Alamein*.

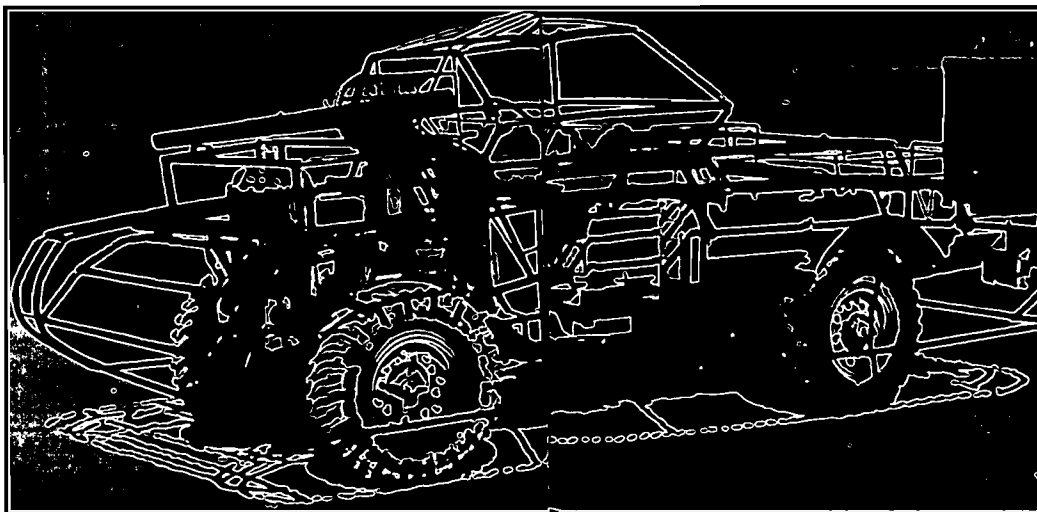


**PHOTO 38. Tank Decoy**



**PHOTO 39. Tank Decoy**

The next task was to make *General der Kavallerie* Stumme, the acting commander of the *panzerarmee*, and his staff think that the main attack would be launched in the southern sector, in one of the locations where they expected an attack. Of course, this was not very popular with XIII Corps, but they executed the plan to the best of their abilities. Besides the various other methods adopted, the Royal Engineers built large dummy supply dumps in the area, as well as a dummy pipeline and water installations. The apparent progress of the work on these projects was staged so that it would appear to the Axis intelligence services that the work would be completed in the first or second week of November, a week or two after the actual date of the attack. Finally on the night of the attack itself, dummy radio traffic was to be generated by the headquarters of the 8<sup>th</sup> Armoured Division, which would indicate that a large move of armored forces was taking place in the southern sector.<sup>22</sup>



**PHOTO 40. Tank Decoy Frame**

### **5.3. FIRE SUPPORT**

#### **5.3.1. AIR SUPPORT**

Air preparations for the coming battle were greatly facilitated by the effective cooperation between Air Chief Marshal Tedder and Air Vice-Marshal Coningham, which stemmed from their long association. Marshal Tedder's policy had been to disrupt the Axis supply system and to gain air superiority. He had the equivalent of 104 squadrons at his disposal in the Middle East. The Desert Air Force under Air Vice-Marshal Coningham had a total strength of 530 serviceable aircraft (out of 750 on hand, not including 54 transports) against about 350 serviceable Axis combat aircraft. The aircraft of the Desert Air Force, unlike their Axis opponents, were well supplied with fuel and ordnance. The aircraft available included a number of hard-hitting medium bombers and two squadrons (No. 6 and No. 7 South African squadrons) of the new tank-busting Hurricane IIDs, armed with twin 40mm cannon firing armor-piercing shot. It was planned to use the tank-busting Hurricanes mostly in the southern sector of the XIII



Corps. It was felt that the Axis air defenses were too powerful in the northern sector (see Appendix J, Allied Order of Battle). This force also included some American units.<sup>23</sup>

The first American unit, called "Project No. 63," arrived in North Africa in early June 1942 with twenty-three B-24D Liberators under the command of Colonel Harry Halverson. They were stationed at Fayid on the Great Bitter Lake near the Suez Canal. After attrition from raiding Ploesti, Rumania and various sources, they were soon reduced to seventeen bombers. On 28 June, Major General Lewis H. Brereton arrived at their airfield with seven B-17s (mostly survivors from the 9<sup>th</sup> Squadron, 7<sup>th</sup> Bombardment Group). Major General Brereton then assumed command of the US Army Middle East Air Force (later (November 1942) designated the US 9<sup>th</sup> Air Force) and the US Army Air Force elements in the area. Soon, Major General Lewis H. Brereton was reinforced by the 98<sup>th</sup> Heavy Bombardment Group (B-24s), the 12<sup>th</sup> Medium Bombardment Group (B-25 Mitchells), and the 57<sup>th</sup> Fighter Group (P-40Fs). Before these inexperienced American units were committed to battle, they were given "the full benefit" of the accumulated experience of the British Desert Air Force. Just before the battle, Air Chief Marshal Tedder noted, *"The Americans work in very well with our squadrons... They now have their own fighter wing with two squadrons (64<sup>th</sup> and 65<sup>th</sup>) who have already shown up well in combat. Their third squadron (66<sup>th</sup>) which has had more experience and which we can make reasonably mobile, is in one of our own fighter wings (No. 239) and will go forward. They are learning from us and we are learning from them..."*<sup>24</sup>

On 9 October, Air Vice-Marshal Coningham's Desert Air Force began the systematic bombing of Axis supply bases, harbors, and airfields in southern Italy and Cyrenica in preparation for the 8<sup>th</sup> Army's coming offensive. About 500 bombers, primarily from Malta, participated in these raids. The day after this Allied air offensive began, Field Marshal Albert Kesselring responded with another all-out attempt to neutralize the island's bases. This time, however, his fighters and bombers were defeated outright. After this, all he could do was strengthen the fighter escorts to North Africa, his limited resources could no longer restrain the Allied air and naval assets on Malta.<sup>25</sup> Between 8 September and 18 October, excluding operations from Malta and anti-shipping operations, the RAF flew 8,606 sorties (just under 210 per day) and the Americans flew 444. For their effort, the British lost 54 aircraft and the Americans lost 7 against Axis losses of 50 German and 27 Italian aircraft. On 19 and 20 October, the attack on the Axis fighter force in the forward area was begun by the Baltimores of Nos. 55 and 223 Squadrons and the fighter-bombers of Nos. 12 and 24 Squadrons, South African Air Force, and No. 45 Squadron, Royal Australian Air Force. The main targets were the forward Axis airfields at El Daba and Fuka. Between 19 and 23 October, the British squadrons flew another 2,209 sorties (about 490 per day) and the Americans flew an additional 260. Some 300 tons of bombs were dropped during these missions. During this period, the British lost 17 aircraft and the Americans lost 1 against 13 German aircraft and an unknown number of Italian aircraft destroyed. For the first night of Operation Lightfoot, the Desert Air Force planned to undertake attacks, starting at 2200, against the known positions of the *panzerarmee's* long-range artillery in support of the 8<sup>th</sup> Army's counter-battery effort. This was necessary because many of these hostile batteries were beyond the reach of the British long-range artillery. Later in the night, the Desert Air Force was to switch to the assembly areas of the *panzerarmee's* panzer and armored divisions.<sup>26</sup>

### 5.3.2. ARTILLERY SUPPORT

In preparation for the attack, the 8<sup>th</sup> Army's Chief of Royal Artillery (CRA), Brigadier S. C. Kirkman oversaw the careful development of the artillery plan. Of the 939 guns on-hand, 31 were held in reserve or in workshops, leaving some 908 artillery pieces to support the attacks of XIII and XXX corps. Their first task was a very heavy counter-battery bombardment to neutralize all known Axis artillery positions, then they would shift to the forward defensive positions and minefields. The field artillery provided a total of 856 guns of which 832 were 25-pounder gun-howitzers (87.5mm, including 16 assigned to the 121<sup>st</sup> Field Artillery Regiment that were mounted on a Valentine tank Chassis and called "Bishop") and 24 were the excellent American-built M7 "Priest" self-propelled 105mm howitzers. The medium artillery regiments provided an additional 52 guns of which 32 were 4.5" (114mm) and 20 were 5.5" (140mm). Against the Allies with 908 field and medium artillery pieces and plenty of ammunition, the *panzerarmee* could only muster 475 field and heavy artillery pieces (200 German and 275 Italian) with limited ammunition. General Montgomery weighted his main effort, the attack by XXX Corps, with the

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<sup>i</sup> The improvised "Bishops" proved unsatisfactory. The 8<sup>th</sup> Army soon discontinued their use. *Alamein*, pages 84-85.

support of 408 25-pounder and 48 medium guns. There was a gun every 15.5 meters. The average rate of fire was to be two rounds per gun per minute (see Appendix I, Axis Order of Battle; and tables 15 to 17).<sup>27</sup>

**TABLE 15. ALLIED FIELD ARTILLERY**

Equipment	Origin	Number	Range (km)	Wt. Of Shell (kg)	Rate of Fire (rpm)
25-pdr gun-howitzer	UK	50	12.3	11.34	2
105mm SP	US	24	11.2	14.90	10
4.5" gun	UK	3	22.2	25.00	2
5.5" gun	UK	20	14.8	45.35	2

In the northern zone, for the preliminary counter-battery fire missions on 23 October, all of the field and medium artillery in the corps zone would come under the direct command of XXX Corps: 18 field regiments and three medium regiments, 480 guns in all. At 2140, five minutes after the leading units had crossed the line of departure; the main artillery program would commence with fifteen minutes of counter-battery fire. A great deal of effort had been taken to locate the positions of the Axis guns including ground observation, flash spotting, sound ranging, and aerial reconnaissance.<sup>28</sup> The 48 medium guns of the corps artillery would fire a series of methodical 'murders' on the more distant Axis artillery positions. At the same time, the shorter ranged field artillery (mostly the 25-pounders) which could reach just beyond Miteiriya Ridge from their planned firing positions, were to deal with the closer Axis artillery batteries of the 164<sup>th</sup> *Leicht Afrika* and *Trento* divisions.<sup>i</sup> These 'murders' were arranged so that each known Axis battery position received about one hundred 4.5" or 5.5" shells in a two-minute period, or an equivalent weight of 25-pounder shells (about 200 to 400 shells). The pattern of this counter-battery fire was designed not only towards the destruction of the Axis guns and crews but also to cause the maximum disruption of their lines of communications. After this initial counter-battery program was complete, XXX Corps planned a pause of five minutes, while the divisional field regiments reverted to divisional control. Then, starting at 2200, the remaining corps artillery would fire for some 20 to 30 minutes, depending on the unit, at the *panzerarmee*'s main defensive positions. These fires would serve to suppress the defenders while XXX Corps began to breach the first minefield belt.<sup>29</sup>

The New Zealand artillery, for example, was supplemented with three troops from the 78<sup>th</sup> Field Regiment, Royal Artillery, and three troops of the 98<sup>th</sup> Field Regiment, Royal Artillery, from the 1<sup>st</sup> and 10<sup>th</sup> Armored Divisions, and also a 4.5-inch battery of the 69<sup>th</sup> Medium Regiment. This brought the total number of field and medium guns supporting the attack of the 2<sup>nd</sup> New Zealand Division to 104.<sup>30</sup>

The artillery fire support plan required a huge expenditure of ammunition; take for example, the 2<sup>nd</sup> New Zealand Division. In four nights, 72 trucks dumped 48,384 rounds of 25-pounder ammunition for the 96 field guns and on the fifth night, they dumped another 160 rounds per gun for the 72 New Zealand field guns (another 11,520 rounds) and 8,000 rounds of Bofors ammunition as well. A total of 111,744 rounds were available for all of the divisional field guns, of which 1,384 rounds (17%) were smoke. This was made possible by the work of the divisional ammunition company.<sup>ii</sup>

<sup>i</sup> For example, the 25-pounders of the 2<sup>nd</sup> New Zealand Division could not range the counterattack units of *Kampfgruppe* Sud (comprised of elements of the 15<sup>th</sup> Panzer and 133<sup>rd</sup> *Littorio* Armored divisions) dug in along El Wishka Ridge without first displacing forward.

<sup>ii</sup> In 12 days of fighting (23 October to 4 November 1942), the 8<sup>th</sup> Army would expend over 1,000,000 rounds of 25-pounder ammunition (an average of 102 rounds per gun per day) as well as about 51,000 rounds of 4.5-inch (133 rounds per gun per day) and about 38,000 rounds of 5.5-inch (157 rounds per gun per day). 2<sup>nd</sup> New Zealand Divisional Artillery, by W. E. Murphy, Official History of New Zealand in the Second World War, 1939-1945, Historical Publications Branch, Department of Internal Affairs, Wellington, New Zealand, 1966, page 379.



TABLE 16. ARTILLERY FIREPOWER COMPARISON, XXX CORPS BREAKTHROUGH SECTOR

Unit	Equipment	Number	Wt of Shot (kg)	Rate of Fire (rpm)	6.6 km (kg/min)	7.0 km (kg/min)	9.1 km (kg/min)	10.0 km (kg/min)	10.6 km (kg/min)	11.2 km (kg/min)	12.3 km (kg/min)	14.8 km (kg/min)	22.2 km (kg/min)
9 <sup>th</sup> Aus Div	25-pdr gun-how	96	11.34	2	2177	1905	2177	2177	2177	2177	2177		
51 <sup>st</sup> Div	25-pdr gun-how	84	11.34	2	1905	1905	1905	1905	1905	1905	1905		
2 <sup>nd</sup> NZ Div	25-pdr gun-how	96	11.34	2	2177	2177	2177	2177	2177	2177	2177		
1 <sup>st</sup> S.A. Div	25-pdr gun-how	84	11.34	2	1905	1905	1905	1905	1905	1905	1905		
23 <sup>rd</sup> Armd Brigade	25-pdr gun-how	16	11.34	2	363	363	363	363	363	363	363		
XXX Corps Artillery	4.5" gun	32	25.00	2	1600	1600	1600	1600	1600	1600	1600	1600	
1 <sup>st</sup> Armd Div	5.5" gun	16	45.35	2	1451	1451	1451	1451	1451	1451	1451		
	25-pdr gun-how	48	11.34	2	1089	1089	1089	1089	1089	1089	1089		
	105mm SP	24	14.90	10	3576	3576	3576	3576	3576	3576	3576		
10 <sup>th</sup> Armd Div	25-pdr gun-how	72	11.34	2	1633	1633	1633	1633	1633	1633	1633		
Allied Zone	Total	568			17876	17876	17876	17876	17876	17876	17876	3051	1600
164 <sup>th</sup> Div	7.5 cm GK 15	8	5.47	(20)	875								
	10.5 cm le FH 18	16*	14.81	6	1422	1422	1422	1422	1422	1422			
	Total	24			2297	1422	1422	1422	1422	1422			
Trento Div	75/27	24	6.30	20	3024	3024	3024	3024	3024				
	77/28	20	5.99	(20)	2396	2396							
	100/17	14	12.70	(6)	1067	1067							
	Total	58			6487	6487	4091	3024	1422				
Axis Sector**	Total	84			8784	7909	5513	4446	1422				

\* Includes four French made 105mm howitzers, le FH 18 characteristics were used as an approximation

\*\* Does not include EAD (Echelons Above Division) artillery because of ammunition shortages and General Stumme's decision not to fire these units early in the battle.

( ) Indicates an estimated quantity

Based on Tables 4 and 11, as well as Appendices I &amp; J.

TABLE 17. ARTILLERY FIREPOWER COMPARISON, XIII CORPS BREAKTHROUGH SECTOR

Unit	Equipment	Number	Wt of Shot (kg)	Rate of Fire (rpm)	9.1 km	10.0 km	12.3 km	13.4 km	14.8 km
7 <sup>th</sup> Armd Div	25-pdr gun-how	88	11.34	2	1996	1996	1996		
	5.5" gun	4	45.35	2	363	363	363		363
44 <sup>th</sup> Div	25-pdr gun-how	96	11.34	2	2177	2177	2177		
Allied Zone	Total	188			4536	4536	4536	363	363
Folgore Div	75/27	24	6.30	20	3024	3024			
	100/17	12	12.70	(6)	914				
	Total	36			3938	3024			
X Corps Artillery	105/28	12	15.87	6	1143	1143	1143		
	149/28	7	43.40	(2)	608	608	608		
	Total	19			1751	1751	1751	1751	
Axis Sector	Total	55			5689	4775	1751	1751	

( ) Indicates an estimated quantity

Based on Tables 4 and 11, as well as Appendices I &amp; J.



#### 5.4. MOBILITY, COUNTERMOBILITY AND SURVIVABILITY

In the spring of 1942, the British Army had developed considerable skill at emplacing mines in preparation for the Battle of Gazala. At Gazala, the Royal Engineers had emplace about 500,000 mines on a 60-kilometer front. This huge effort represented the major portion of the divisional engineers' work for some weeks. Veteran divisions (like the 7<sup>th</sup> Armoured and the 4<sup>th</sup> Indian) developed rapid mine laying techniques into a high art. However, fresh engineer units arriving from England were stunned at the mine-laying rate expected of them.<sup>31</sup> After the retreat to El Alamein, following the 8<sup>th</sup> Army's defeat at Gazala, mine warfare began seriously again after 8 July. On this date, the fighting in the initial engagements of the First Battle of El Alamein ground to a stalemate and both sides began mining their mostly static forward positions in massive proportions. For example, on just 17 July while consolidating an objective, the 2<sup>nd</sup>/7<sup>th</sup> Engineer Field Company, 9<sup>th</sup> Australian Division under Lieutenant Murray, laid 2,500 mines in the area around Tel el Eisa Ridge.<sup>32</sup> As another example, Major Murray Reid's 8<sup>th</sup> Field Company, Royal New Zealand Engineers, with a strength that never exceeded 120 men, laid about 70,000 mines in slightly over a month.<sup>33</sup> By the time *Generalfeldmarschall* Rommel was able to launch his next major attack at the end of August, the Allied engineers had emplaced well over 1 million mines in the Alamein position.<sup>1</sup> In fact, even the well-supplied 8<sup>th</sup> Army had to improvise. Many of these mines were fabricated in 8<sup>th</sup> Army operated shops using Egyptian labor (see Photo 41). Brigadier Tickell, Director of Works, Middle East, organized the production of these mines.<sup>34</sup> The resulting minefields, combined with stubborn Allied resistance, fuel shortages and the Royal Air Force, played a decisive part in the defeat of the *panzerarmee* at the Battle of Alam Halfa.<sup>35</sup>



PHOTO 41.

A British Noncommissioned Officer Supervises the Local Production of Egyptian Pattern Mk V Antitank Mines

At El Alamein, beyond the 8<sup>th</sup> Army's defensive minefields (which also had to be breached before the assault troops of Operation Lightfoot could come to grips with the Axis) and no-man's-land, was the immensely strong Axis defensive system of minefields, containing about 500,000 mines, reaching eight kilometers deep in some places. These "mine marshes," as the British called them, stretched from the Qattarra Depression in the south to the Mediterranean in the north and could not be bypassed on either flank. As the 8<sup>th</sup> Army planned for their third offensive across North Africa, General Montgomery recognized that the effective employment of the Allies' massed armor would depend on a successful breach of these massive mine defenses. *Generalfeldmarschall* Rommel's nighttime operational techniques and the success of his pioneers in breaching the densely laid Allied minefields during the Battle of Gazala in May had not gone unnoticed in Allied engineering circles. They had observed with equal attentiveness the near success of the pioneers at overcoming the equally formidable Allied minefields during

<sup>1</sup> For detailed accounts of some of the Allied engineer operations during this period, see *Salute the Sappers, Part I. The Formation of the South African Engineer Corps and its Operations in East Africa and the Middle East to the Battle of Alamein*, by Neil Orpen with H. J. Martin, Sappers Association, Johannesburg, 1981, pages 379-412, and *The Turning Point, With the N. Z. Engineers at El Alamein*, pages 27-160.



the Battle of Alam Halfa.<sup>36</sup> With the circumstances now reversed, the 8<sup>th</sup> Army had to deal with *Generalfeldmarschall* Rommel's fiendish "Devil's Gardens." The development of detailed techniques for the dangerous business of breaching the deep Axis minefields was, perhaps, the most vital of all of the 8<sup>th</sup> Army's preparations for the coming battle.<sup>37</sup> Indeed, the pace of the armor's advance would be determined by the rate at which the sappers cleared the way. The 'devil was in the details' as the sappers prepared to breach the "Devil's Gardens.' This task was the responsibility of the Royal Engineers, and the first requirement they faced was the necessity of gathering detailed obstacle intelligence on these minefield complexes.

#### 5.4.1. OBSTACLE INTELLIGENCE.<sup>38</sup>

Colonel J. M. Lambert, the Chief of Royal Engineers (CRE) for the 44<sup>th</sup> Infantry Division, described in detail their obstacle intelligence gathering efforts as follows:<sup>i</sup> *"One of the requirements in "Operation Lightfoot" (as the Battle of El Alamein was then known) was for XIII Corps to breakthrough the enemy's protective minefields near his southern flank. It was necessary, therefore, to find out as much as we could about those minefields—their number, positions and widths, and if possible the pattern, density and nature of the mines within them. None of this information was easy to come by; and even when obtained it had to be checked and kept up to date.*

*A favorite analogy for a minefield breaching operation is that of an opposed river crossing. There are points of similarity-but not in reconnaissance. The position and width of the river are static, or at least predictable; it can be seen, photographed and roughly measured, at any rate from the air. A minefield may double its width invisibly in a night; its near bank may advance, or its further bank recede (the latter may occur even whilst the breaching is actually in progress). The banks may be invisible, or, if visible, may prove to be false banks. It is often very difficult to be certain whether an apparent minefield is fact or fiction.*

*During the four months we had been in occupation of the Alamein position, a lot of information about enemy minefields had been obtained, but not much of it was of value. CREs of divisions used to keep plans of all known, suspected and reported enemy minefields on their divisional fronts. These plans would be covered with a mass of little arrows, and notes in circles such as "Noises of minelaying heard here"- "Carrier patrol blown up"- "One tellermine found here"- "Cattle fence-no mines"- "some mines-no fence." Visitors seeing the title of the picture, "Enemy Minefields" would look at it with interest, but they soon changed the subject.*

*The sources from which information was obtained were as follows:*

*a) Air photographs - The existence of a minefield, and its general run, could sometimes be inferred from vehicle tracks converging on the gaps. But the shape of the minefield between the gaps could only be guessed at. Where boundary fences existed they could sometimes be distinguished on low level obliques taken when the fencing posts threw long shadows. In long-established minefields the desert vegetation such as camelthorn, being undisturbed, sometimes grew sufficiently to be distinguishable.<sup>ii</sup>*

*b) Reports from prisoners - Very little use. According to most prisoners (Italian infantry?) at this time they spent nearly all their time laying mines. But they never knew where. As there were practically no landmarks this was not surprising.*

*c) Listening Reports - "Sounds of enemy minelaying" were reported nearly every night from various parts of the front. Range and direction were usually vague and the reports not much use; except as an indication of the degree of enemy minelaying activity.*

*d) Patrol Reports - Infantry patrols went out every night and, latterly at any rate, a sapper NCO accompanied each patrol. Sometimes a R.E. recce party would go out with infantry protection,*

<sup>i</sup> A similar effort was made in the XXX Corps sector, however, it seems to have been impeded by security requirements and no detailed account of it has been found to date. However, Lieutenant-Colonel McMeekan, CRE of the 10<sup>th</sup> Armoured Division noted, *"We now encountered the second staff blunder: when I arranged for R.E. patrols to motor up the fifteen miles to Alamein after dark each night, and to go out across No-Man's-Land on foot to recce our front, the Highlanders in the line objected strongly, as, to prevent leakage of information through casualties or captures in the enemy minefield, they had orders that no member of X Corps was to be allowed forward of our wire. In fact, the New Zealand infantry and sappers were likewise prohibited. We did manage to get patrols out the first night, conforming to our own divisional orders, but after that it was stopped."* "The Assault at Alamein," page 323. Nevertheless, an American observer with the 1<sup>st</sup> Armoured Division, X Corps, reported, *"The approximate location of the enemy minefields was determined by ground and aerial reconnaissance. Front line patrolling by RE units disclosed the forward edge of the fields. Aerial photographs of the area were studied, and these, together with a knowledge of previous German methods and contour maps giving details of the terrain, provided an outline of the fields that proved quite close to the real situation. There were found to be three main belts in the enemy minefields. Each belt averaged about 200 yards in extent and contained irregularly scattered mines. Back of each belt were five, ten, or fifteen rows of mines. The fronts of the German minefields were unmarked. The rear boundaries were marked with wire or by warning signs."* "Notes on Eighth Army Minefield Clearance," Military Reports on the United Nations, No. 5, Military Intelligence Service, War Department, Washington, D. C., 15 April 1943, page 23.

<sup>ii</sup> This would seem to imply that a defender should periodically rotate gaps and lanes.



but this didn't seem to work very well. Sapper NCOs leading infantry patrols became exceedingly skilled at visual mine detection, or rather mine avoidance. They knew the sort of places in which the enemy was apt to lay mines, and could recognize, even in starlight, the sort of ground on which it was safe to tread. They usually carried a "short-arm" detector, but seldom used them. Mines were often "stolen" from enemy minefields and brought back by these patrols, but the position from which they were lifted could seldom be pin-pointed. Nor could negative information (e.g., that a certain area was not mined) be entirely relied on. It was possible for a patrol to walk right through a (antitank) minefield at night without being aware of it.

e) Daylight Ground Reconnaissance - This was the best and perhaps the only way of getting reliable, useful information; but it was difficult, and limited in scope. It was done by sapper officers, usually alone-sometimes in pairs. On a hot day the best time was the early afternoon when there was a considerable haze-and the enemy was apt to be somnolent; otherwise at dusk. An officer, saying merely that he was "going snooping" would wander off into the haze about 3 p.m., carrying only a compass and binoculars, and return after dark. The haze obscured or completely distorted a crawling man at about 200 yards. But about 5 p.m. it cleared and compass bearings could be taken. So the dodge was to get right up to the enemy minefield in the haze, lie up for an hour or so, reconnoitre and take bearings, and lie up again until dark. It was a good game and the players were seldom spotted.

Reconnaissance on the lines described above had been going on over a period of months and we had in consequence a general idea of the enemy's minefield layout opposite the corps front, but very little detail. The plan opposite is from one made at the time (see Map 5). It is by no means accurate, but was roughly what we had to work on in planning "Lightfoot." It shows the supposed enemy dispositions in his foremost defended localities, from Alam Nayl on the north to Himeimat in the south. A number of suspected tactical minefields have been omitted. The enemy F.D.L.s (Forward Defense Lines) were occupied by an Italian parachute division (Folgore) and a number of German "groups"; of these latter the Hubner and Burkhardt groups (of Fallschirmbrigade Ramcke) had been identified. And it was suspected, rightly, that the 21<sup>st</sup> Panzer Division had been brought south for the pending battle.

Alam Nayl, known also as the New Zealand Box, was garrisoned by an Infantry Division (this appears to be the Brescia and elements of the Ramcke brigade) and we regarded it as impregnable. It lay at a slight elevation, rising gradually towards the Ruweisat Ridge to the north.

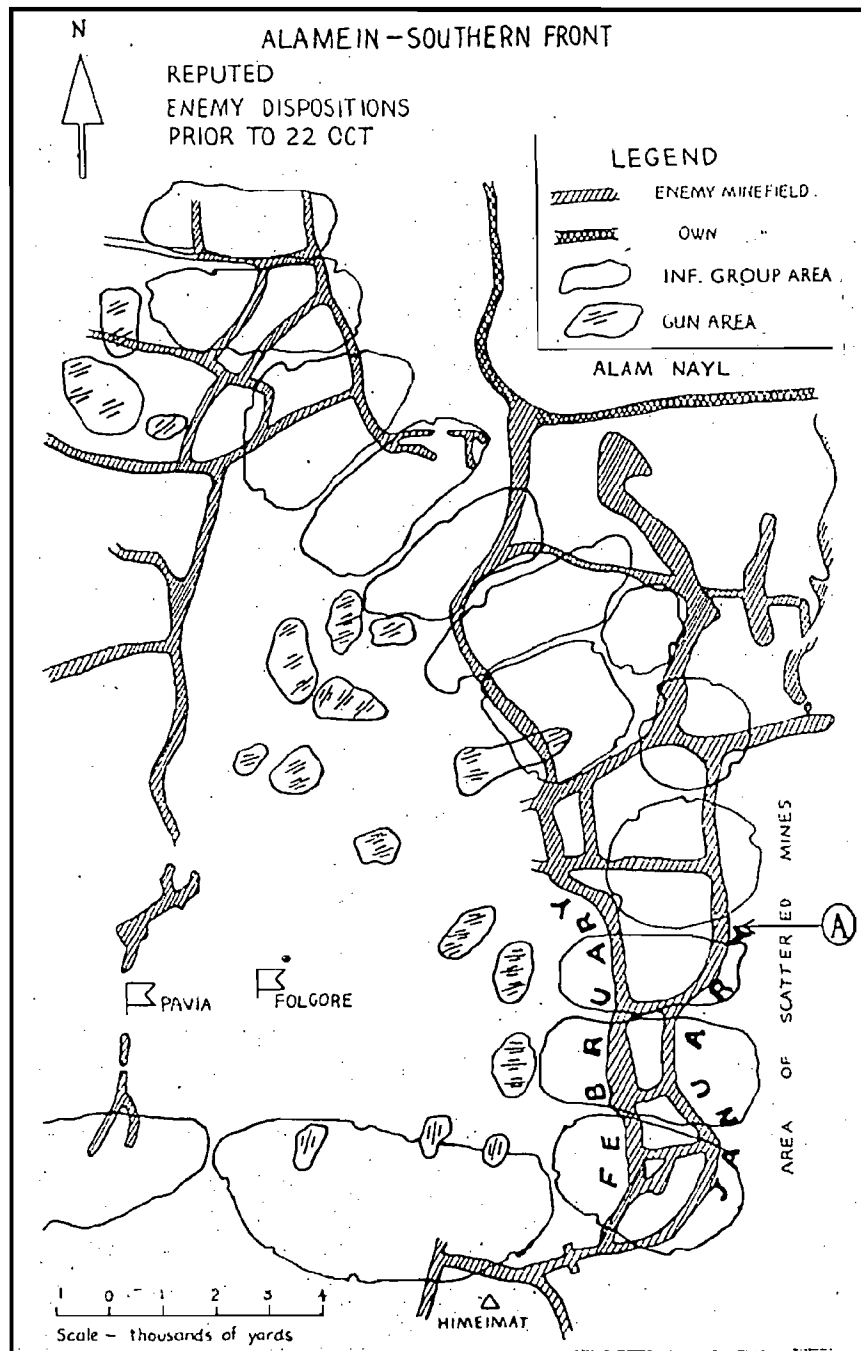
Himeimat, marked on the maps as "curious twin peaks" dominated the whole southern flank. It stood like a sentinel against the southern horizon and on a clear day can be seen from the Mediterranean shore, some thirty miles distant. Unfortunately, it was in enemy hands and provided him with a magnificent O.P. Immediately south of Himeimat, lay the impassable Qattara Depression.<sup>1</sup>

From Alam Nayl to Himeimat ran two former British minefields named "January" and "February." These had been laid by us as defensive minefields during the previous spring; but on the enemy's arrival at Alamein he had captured them, together with Himeimat, and used them as his protective minefields (called "Nuts" and "May"). He was well dug in behind and between them and to a small extent in front of them. Of what additions or alterations he made to them we had little information. We had replaced them, so to speak, by laying two more parallel minefields about three miles to the east.

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<sup>1</sup> Although the Qattara, a depression 15 meters below sea level of soft sand dunes and salt marsh, was impassable to large motorized formations, there were old caravan tracks through it that David Stirling's famous SAS (Special Air Service) used for moving raiding parties with a small numbers of trucks to gain access to the Axis rear.





*In Operation Lightfoot, therefore, the breaching of "January" and "February" seemed likely to be the main engineer tasks. We had no up-to-date knowledge of "February."<sup>ii</sup> Of the nearer "January" we knew the following:*

- a) The front fence of the minefield was still on its original alignment as surveyed in at the time we constructed it. The further fence, where it could be seen, also appeared to be intact and unmoved.

<sup>i</sup> Practically speaking, it was very difficult and dangerous for patrols to explore any minefields but the foremost belts.

b) No material alterations to the mines appeared to have been made, at any rate near the front fence. All mines “stolen” to date had been British Mark IVs or E.P. (Egyptian Pattern) and none had been found trapped.

c) No anti-personnel mines had been found, other than a small number of Mark II shrapnel mines originally laid by us (most of these, incidentally, had become non-operative). No “S” mines had been discovered near the front fence—which was the enemy’s favorite place for putting them.

d) The enemy laid tellermines on our side of the front fence to a depth of at least 300 yards. They appeared to have been laid at random in groups of up to five. They were just buried, sometimes only half buried, in patches of soft sand and unmarked. It seemed probable that every enemy patrol going out had been given fives mines and told to leave them lying about. (During the course of the battle more than 1,000 of these scattered mines were lifted—all were tellermines. No anti-personnel mines had been laid—for obvious reasons.)

e) The enemy’s foremost defended localities were immediately in rear of “January” or possibly inside it in some cases. Some small posts dug just in front of it appeared to be occupied only at night.

f) There were no substantial barbed wire or other obstacles.

When the plan for “Lightfoot” became firm, it was decided to carry out an engineer reconnaissance of the line of advance up to the “January” minefield at the place where the breach was to be made (Point A on plan). This reconnaissance had obviously to be made on the quiet. Any reconnaissance in force, or preliminary mine-clearing operation in front of “January” at this point would have given the game away, and defeated its object by leading the enemy to alter his minefield layout at the crucial point.

At dusk, a few days before the battle, a sapper officer from 44<sup>th</sup> Division, R.E., was dropped by armored car about a mile due east of Point A (see Map 5). He then walked and crawled on a compass bearing due west. The going was reasonably good until about 200 yards short of the minefield where the ground became broken. He got up to the minefield but could not see beyond as it lay on a slightly hump-backed ridge. On returning to the armored car in bright moon-light he was fired on, presumably by a patrol, but got back safely. The site seemed suitable; the broken ground might necessitate some work on the approaches, but it would provide some cover where it would be needed. There was risk, which had to be taken, that the enemy had added a “vertical” or cross minefield between “January” and “February” immediately opposite Point A. The width of the minefield at this point as originally laid was 300 yards.”

Another area of concern that had to be addressed by technical reconnaissance was the trafficability of the terrain over which the attack must move. The Allies went to endless trouble to obtain information as to what the ground was like in the area over which they planned to move. Aerial photos, prisoner interrogations, questioning of their own troops who had at one time or another traversed these areas—all were checked (see Appendix H).<sup>39</sup>

#### 5.4.2. TRAINING

The 8<sup>th</sup> Army attempts to launch counterattacks against the stalled *panzerarmee* in July had resulted in a number of disasters. For example, the 69<sup>th</sup> Infantry Brigade, 50<sup>th</sup> Infantry Division mounted one such attack on 27 July. They were supposed to have been supported by the 1<sup>st</sup> Armoured Division. However, the armor commander was dissatisfied with the width of the breach made by South African engineers through a minefield. As a result of his timidity, the armor did not advance through the breach, leaving the infantry exposed to an attack by *Generalfeldmarschall* Rommel’s panzers. He recorded that, “*The British had again suffered heavy casualties—a thousand prisoners and thirty-two tanks—and their command now lost all taste for further attacks.*”<sup>40</sup> Brigadier Frederick H. (“Cecil”) Kisch,<sup>i</sup> the Chief of Royal Engineers for the 8<sup>th</sup> Army (Photo 42), was deeply concerned over setback, leaving notes which are more than usually detailed. His biographers noted, “*Consequent on these difficulties, his most significant work as Chief Engineer of the Army was done. Even in July, the British formations were coming to grief on the first of the German minefields. As the fighting died and the position stabilised, it was*

<sup>i</sup> Brigadier Kisch, and four others, were later killed by a German ‘S’ mine at Wadi Akarit (in Tunisia) on 7 April 1943. For an eyewitness account of this incident, see “Seventy Men. A Troop of Sappers with the Eighth Army in Early 1943,” by Nitebar, *The Royal Engineers Journal*, Vol. 107 No.1, April 1993, pages 68-69.

evident that, if the Eighth Army were to attack again, the enemy mines would present an obstacle that had previously never been imagined.

On July 31<sup>st</sup>, Kisch noted: "C.E. 13 Corps visited me for a discussion of mine clearance, etc." During long nights of talk in the six-foot square, uncomfortably sited tent, the technique of mine clearing with minimum casualties came into being over a glass of whiskey and a pipe. . . on the other side it is not to fanciful to suppose that the German engineers were discussing the problems of laying vast new minefields while not far away plans were made to overcome them.

Mines were a different sort of risk from that which soldiers had been accustomed. Whether it was the flash of a descending sabre, the whisper of a bullet, or the demoralising whistle of a shell, a soldier had at least been able to count on a fair probability of warning of the extreme imminence of danger. The strain came when a charge was imminent, and at such moments as 'going over the top.' When mines had to be faced, it was different; periods of nervous tension were incomparably longer. For this reason the risk of panic was always present in a mines area. The danger can neither be seen nor heard in anyway before it strikes.

A definite mental readjustment to become 'mine-minded' is necessary to face this sort of danger. Those who face it best and with least strain, face it subconsciously; without thought, watching, searching, finding and avoiding it. The adherence, without thought to a fixed procedure, is known to the Army as a 'drill.' This provided the answer to the problem of defeating the minefield weapon. The success of the 'Minefield Breaching Drill' is a lesson to those who feel inclined to despise an action done 'without thought.' The security given by this drill was eventually so much taken for granted, that men became careless-but that was another problem.

Mines are different from other weapons in a further way; something in the nature of any form of trap is, in a sense, shocking. Moreover, a premium is set on any form of beastliness; -charges are connected to dead or wounded men to destroy those who came to their help. For this reason, particularly, mines can present more than their true danger to the imagination. There was another element in the fear they induced. It is possible for a soldier to take a fatalistic attitude to the danger of shells and bullets. Once they have been fired, they travel on their courses sufficiently fast to make evasive action impossible, unless it is the basic and instinctive 'drill' of a dive to earth. With mines, danger is always imminent. When the soldier enters the minefield of his own determination, in order to clear a path, he finds it much harder to be fatalistic about the situation, and to remain fatalistic not for instants, but for hours at a time. It is evident to him that much depends on his own actions; the way he moves his feet, his hands, his fingers; a glancing look; the speed of his reactions, which in turn depend on his frame of mind-all come into it.



**PHOTO 42. Brigadier "Cecil" Kisch,  
General Montgomery's Chief of Royal Engineers**



*The drill evolved by Brigadier Kisch and Brigadier Gaussen cannot be described without using a large number of technical terms. It was, however, based on six broad principles.*

- (1) An infantry bridgehead must be formed, under cover of an intense artillery barrage, capable of rapid modification.*
- (2) Sappers then followed, working upright (not prone, as before), and once having started, must go right through with the job. Replacement of casualties had, therefore, to be incorporated into the drill.*
- (3) The drill must be so definite, universal and simple that every man could concentrate on it, whatever the outside distraction and interference.*
- (4) The route up to and through the cleared lane must be so foolproof that even the most stupid of tank drivers could not miss the way.*
- (5) R.E. units must have wireless and a system of intercommunication with units using the gap.*
- (6) Minefield breaching operations must be done at night.”<sup>41</sup>*

In August, based on intelligence indicating the extent and sophistication of the Axis mine laying effort, General Auchinleck formally tasked Brigadier Kisch with the daunting mission of getting the 8<sup>th</sup> Army through the Axis mine boxes. With General Montgomery’s arrival in late August, Brigadier Kisch assigned Major Peter Moore, Commander of the 3<sup>rd</sup> (Cheshire) Field Squadron and a Cambridge graduate in Mechanical Sciences, the task of creating a precise and effective drill for mine clearance. Major Moore, together with Captain T. L. Gibbs (a New Zealand Engineer), and his other assistants took into consideration everything then known about Axis mines and how they were laid. From this, they developed a methodical, standard drill for lifting mines. Major Moore noted, *“The existing methods based on detailing sub-units, giving them a mine detector, if available, and leaving them to get on with it, were all right for clearing minefields not under fire or those met with during a night approach march, for extracting vehicles from our own or for getting through very shallow minefields. The lack of a uniform method led to Divisional Engineers being asked to perform impossible tasks or being asked to make gaps which were quite inadequate for the tactical operations in view. CsRE also had no reliable data on which to give advice to their divisional commanders.”<sup>42</sup>* Every division and corps Chief of Royal Engineers in the 8<sup>th</sup> Army had put forward suggestions from which a standard drill was prepared, but it was left to each commander to make such variations as he thought necessary, based on available equipment and his mission.<sup>43</sup> Indeed, there had to be some compromise between the tankers and the sappers. As Lieutenant-Colonel McMeekan noted, *“The armour wanted gaps 40 yds. wide, as in soft ground the leading vehicles churned up the sand so badly that those following needed space to avoid the worst patches. To clear gaps of this width would have been a slow business, and unfortunately our first night exercise was held in one of the softest pieces of the desert that I have ever met, and confirmed their claim. However, the Divisional Commander by now must have known more than we did, and upheld my contention that with resources available, the best plan was to go for 16yds. In the first instance, and widen later. Events proved this width to be enough on the good going at Alamein.”* However, Major Moore states that the 10<sup>th</sup> Armoured Division’s breaches were initially only 8 yards (7.3 meters) wide.<sup>44</sup>

Although each of the Allied divisions had its own concept of the most effective procedure, the drill created by the British 1<sup>st</sup> Armoured Division, with the assistance of Brigadier Kisch and Major Moore, was the one finally taught at the Haifa Staff College. In that division, the minefield task force consisted of an infantry battalion, two of the division’s sapper squadrons, an Army Field Company (Royal Engineers), three troops of tanks, a detachment of military police and a detachment of Royal Signals. Major Moore felt that this was the best as *“This recognised the truth of the saying I heard as a young officer ‘Sappers can either work or fight, they cannot do both at once.’”<sup>45</sup>* The 1<sup>st</sup> Armoured Division’s entire task organized breach force was then placed under the command of the infantry battalion commander (the minefield task forces used by the various armored divisions are shown in tables 18 to 20). The new minefield breaching drill reflected General Montgomery’s ideas for a battle of attrition that would fully exploit the burgeoning Allied superiority in numbers and equipment.<sup>46</sup>

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<sup>1</sup> Surprisingly, none of the divisional minefield task forces of the 8<sup>th</sup> Army during the Second Battle of El Alamein had the ability to recover an immobilized vehicle from a breached lane. The recovery of disabled tanks was the responsibility of the regimental Light Aid Detachment (LAD), which appear to have moved with the regimental trains. Consequently, the recovery teams may not be able to get forward through the traffic in a timely manner. When they did arrive, much of the recovery work would have to be done from the Axis minefields, where their normal procedure was to winch the vehicle out of the danger zone. This would often require two tractors. Indeed, the breached lanes would be so churned up by the time the recovery teams reached the area, that it would often require two tractors to tow a recovered Sherman or Grant tank back for maintenance. See “Tank Recovery and Maintenance in the Western Desert,” Military Reports on the United Nations, Military Intelligence Service, War Department, Washington, D. C., page 37.

**TABLE 18. 1<sup>st</sup> ARMoured DIVISION MINEFIELD TASK FORCE**

(Commanded by the Commander, 2<sup>nd</sup> Battalion, The Rifle Brigade)

2 <sup>nd</sup> Battalion, The Rifle Brigade (-) (16 6-pounder antitank guns, support company detached to 7 <sup>th</sup> Motorized Brigade)
one troop, 2 <sup>nd</sup> Dragoon Guards Regiment (attached from 2 <sup>nd</sup> Armoured Brigade, 3 tanks)
one troop, 9 <sup>th</sup> Lancers Regiment (attached from 2 <sup>nd</sup> Armoured Brigade, 3 tanks)
one troop, 10 <sup>th</sup> Hussars Regiment (attached from 2 <sup>nd</sup> Armoured Brigade, 3 tanks)
7 <sup>th</sup> Field Squadron, Royal Engineers
9 <sup>th</sup> Field Squadron, Royal Engineers
572 <sup>nd</sup> Army Field Company, Royal Engineers (attached from 8 <sup>th</sup> Army)
Signals and provost detachments

**TABLE 19. 10<sup>th</sup> ARMoured DIVISION MINEFIELD TASK FORCE**

(Commanded by Lieutenant-Colonel Gilbert R. McMeekan, the division's Chief of Royal Engineers)

3 <sup>rd</sup> Field Squadron, Royal Engineers
571 <sup>st</sup> Army Field Company, Royal Engineers (attached from 8 <sup>th</sup> Army)
573 <sup>rd</sup> Army Field Company, Royal Engineers (attached from 8 <sup>th</sup> Army)
detachment, 141 <sup>st</sup> Field Park Squadron Royal Engineers (detached from 10 <sup>th</sup> Armoured Division Troops)
Signals and provost detachments

**TABLE 20. 7<sup>th</sup> ARMoured DIVISION MINEFIELD TASK FORCE**

(Commanded by LTC Corbett-Winder, Commander, 44<sup>th</sup> Reconnaissance Regiment)

44 <sup>th</sup> Reconnaissance Regiment (LTC J. L. Corbett-Winder, detached from 44 <sup>th</sup> Infantry Division, mounted in Universal Carriers)
A and B Companies, 1 <sup>st</sup> Battalion, The Rifle Brigade
One troop of 3 Stuarts, Royal Scots Greys Regiment (attached)
4 <sup>th</sup> Field Squadron, Royal Engineers (attached from division troops)
detachment from 21 <sup>st</sup> Field Squadron, Royal Engineers (attached from division troops)
Two troops with 7 Scorpions (attached from 1 <sup>st</sup> Army Tank Brigade)
4 <sup>th</sup> Field Regiment, Royal Artillery (attached from Div Troops, 16 25-pounder gun-howitzers, in 2 batteries of 8 guns)
97 <sup>th</sup> Field Regiment, Royal Artillery (attached from Div Troops, 16 25-pounder gun-howitzers, in 2 batteries of 8 guns)

At about the same time, on 18 September, the 8<sup>th</sup> Army School of Minefield Clearance, with Major Currie,<sup>i</sup> as the Commandant and Chief Instructor, was established in a quiet piece of desert at Burg el Arab. Officers at the school refined the countermine plans and gave much thought to the problem of minefield reduction in the danger-studded mine gardens. The school's mission was to draw men from both the engineers and the infantry; train them in countermine techniques and then return them to train others in their units. An American observer reported that a minimum of one officer and three noncommissioned officers from each field company and field park company of the Royal Engineers were required to complete a 7-day course.<sup>47</sup> Other sappers went through courses on the operation and maintenance of the fragile, new electronic mine detectors. The 8<sup>th</sup> Army made it clear to the school that they must achieve positive results before the forthcoming Allied offensive, when Allied forces would have to breach the Desert Fox's mine boxes.<sup>48</sup> They accomplished their task, training personnel from 56 different engineer units in time for the rehearsals, which began in September, for the Second Battle of El Alamein. The school also helped most of the Allied divisions to form composite minefield task forces that were tailored to their requirements.<sup>49</sup>

<sup>i</sup> Wounded by a mine in July 1942, Major Currie was a New Zealand Engineer officer. After the war, he served as Chief Engineer of the New Zealand Army from 1951 to 1960. See *Alam Halfa and Alamein*, page 224. For a detailed account of the 8<sup>th</sup> Army School of Mine Clearance, see *The Turning Point, With the N. Z. Engineers at El Alamein*, pages 164-166.



The 8<sup>th</sup> Army's standard dismounted minefield breaching drill (sketches 11 and 12), developed by Major Peter Moore and the mine clearing school, was done in logical stages. This drill was based largely on captured German documents.<sup>50</sup> Although the mine clearing may halt temporarily if the engineers were brought under fire, the sequence of events remained the same and the sappers were expected to continue mine clearing so long as one engineer remained. To execute this task, first, the minefield had to be detected; then its near and far boundaries were established, marked, and the entire lane cleared of the dangerous S-mines. Next, a centerline for the lane to be cleared was marked. Then the outer edges of the lane were marked. Finally, the antitank mines were lifted and the cleared gap was marked with lights and signs. Every sapper had to be trained in all of these engineer tasks, for experience had shown that it was seldom that a lifting job, done under fire, did not entail casualties.<sup>51</sup>

This standard drill<sup>52</sup> envisaged a gapping detachment, based on an engineer section from a field company, of 2 officers, 7 noncommissioned officers and 51 enlisted soldiers. This could be tailored by the various units, for example, the 2<sup>nd</sup> New Zealand Division, based on shortages of engineers, modified the drill such that 1 officer and 44 enlisted soldiers, organized as shown in Table 21, could execute the mission.

**TABLE 21. ORGANIZATION OF A GAPPING DETACHMENT**

<u>Element</u>	<u>New Zealand Engineers</u>	<u>8<sup>th</sup> Army Standard</u>
Reconnaissance Party	1 officer, 1 NCO and 3 EMs	1 officer, 1 NCO and 3 EMs
No. 1 Party (tape laying)	1 NCO and 9 EMs	1 NCO and 9 EMs
Nos. 2 and 3 Parties (gapping)	1 NCO and 9 EMs each	1 NCO and 12 EMs each
No. 4 Party (stores and reserves)	1 NCO and 9 EMs	2 NCO's and 12 EMs
Control Party		1 officer, 1 NCO and 4 EMs
TOTAL	1 officer, 5 NCO's and 39 EMs	2 officers, 7 NCO's and 51 EMs

The New Zealand engineers developed the following detailed procedures (sketches 11 and 12) for using non-mechanical means to conduct the standard dismounted breach of a minefield. First, a small engineer reconnaissance party followed the infantry as they advanced. This reconnaissance party consisted of an officer and a few men (nominally 1 officer, 1 non-commissioned officer and 3 troopers). They were responsible for confirming information gathered from patrols, aerial photographs and prisoners and then walking by compass bearing to the minefield. Starting at the line of departure, one member of the party would mark the center of the safe path by letting out a reel of white engineer tape. Since it was difficult for the Axis engineers to conceal digging done at night over a large area and, based on clues such as a barbed wire fence, partially exposed mines and friendly mine casualties, the party attempted to visually locate the leading edge of a suspected minefield. When they found one, they planted a stake with a rearward shining pinpoint blue light. At this point, the officer had to determine the entry point, and direction of the gap. Slowly advancing into the danger area, the men of the reconnaissance party stooped and lightly brushed the ground with the backs of their hands to feel for trip wires. The reconnaissance party was expected to obtain a general idea of the mine types and other obstacles present as well as their general layout and pass this information back to the main body. All eyes searched for trip wires, booby traps or the horns of S-mines, while one man continued to unreel the centerline tape. Any antipersonnel mines that were found had to be removed at this point. This required cool nerves and deft fingers, especially at night, as the sapper had to carefully insert a nail into the sensitive fuze to "safe" the mine before removing it by hand. When the far edge of the suspected minefield was located, another rearward facing blue lamp would be hammered into the ground. Although the typical German mine panel was only about 24 meters deep, areas of randomly scattered mines could reach depths of a kilometer or more.<sup>53</sup>

Second, the tape laying party (1 non-commissioned officer and 9 troopers) was to mark the boundaries of the lane to be cleared. Beginning at the near edge of the suspected minefield, two men (required by the standard drill to be tied to each other to keep them eight yards (7.2 meters) apart) laid parallel tapes on either side of the center line to mark the boundaries of the lane to be cleared. All tapes were pinned every 27 meters (30 yards) to the ground, so that wind, shells or bombs would only disrupt a single section and not the whole length of a breach. Four other men in this party carried Bangalore torpedoes that could be brought forward to breach any wire obstacles encountered by the reconnaissance party. Two "tommy gunners" provided local security.<sup>54</sup>

Third, came the two gapping parties (each with 1 non-commissioned officer and 9 troopers), one on each side of the center line tape, well spaced and echeloned back to avoid unnecessary casualties from bunching up.



Their first task was to carefully ensure that the reconnaissance party had correctly identified the suspected minefield's near edge. Next, working simultaneously with the lane-edge marking party, they checked for antipersonnel mines in the lane employing the same technique as the reconnaissance party but using more men for better coverage. The two parties theoretically cleared a sufficient width for two tanks to pass each other. In practice, however, this width was found to be sufficient only for the narrower, more maneuverable, wheeled vehicles to pass each other, especially at night.<sup>55</sup>

If there were sufficient men and equipment remaining in the gapping teams at this point, parties worked from both ends of the lane towards the center to save time. If the men of the gapping party were using electronic detectors (see photos 59 to 61 and section 5.4.3.4.), then three men walked in-line-abreast, as they swept their detectors from side to side in a circular arc, each clearing a 4½ foot (1.5m) lane. Their lanes were supposed to overlap each other's by one foot (.3m). Each detector operator had a director to help him keep his course straight and insure the sweeps overlapped. When the detector operator located a suspected mine, his director would mark its position with a metal cone fashioned from a fuel can. Then the sweep continued. The detector operators were supposed to be rotated every fifteen minutes. When the electronic mine detectors were not available, as was frequently the case, reliance had to be placed on manual detection by highly skilled sappers who seemed to be able to "smell" the presence of a mine. This had to be done by men crawling the full length and width of the gap while feeling lightly with their hands or prodding with a bayonet and actually touching their neighbors to insure full coverage of the lane (Photo 43).

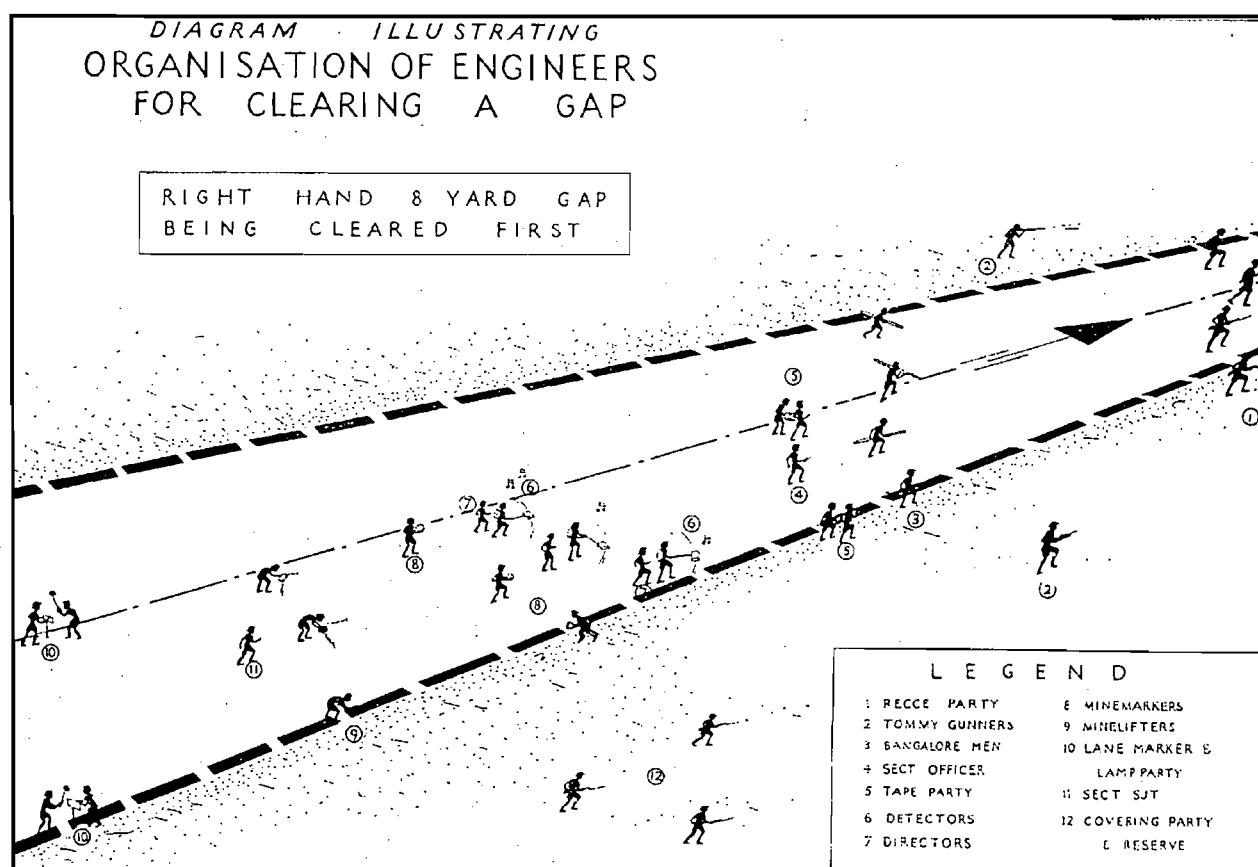
Brigadier Kisch, who, except for his ancient forage cap, looked like any other sapper, had often been seen cheerfully and expertly probing for mines. He actually kept an old German bayonet in his vehicle for just this purpose. The blade, which he inserted gently at an angle, would first touch the side of the mine. He had found that with a little practice, the feel of the loose soil around the mine was enough to indicate its presence.<sup>56</sup> On this same subject, Major Reid of the Royal New Zealand Engineers observed, "*This was also effective, and not nearly so dangerous as it might sound, for one soon got 'the feel of it' and could tell instantly when the bayonet point touched metal. The bayonets were used at an angle, the ground being probed and not jabbed.*"<sup>57</sup> Probing proved to be a very reliable way to locate mines. This technique also had the advantage that it could be done from a crouched or prone position. Any suspected mine was marked with a metal cone.<sup>58</sup>

After the mine detectors (whether manual or electronic), had finished locating the suspected mines, two sappers followed behind at 45 meters (50 yards). This distance was established to reduce casualties if a mine was accidentally triggered while it was being lifted. Approaching the metal cone, the sapper had to confirm the actual presence of an individual mine in the field and pinpoint it by prodding the ground with a bayonet. Most of the time, he found just scrap metal or shrapnel. The markers on confirmed mines were left while the rest were removed.

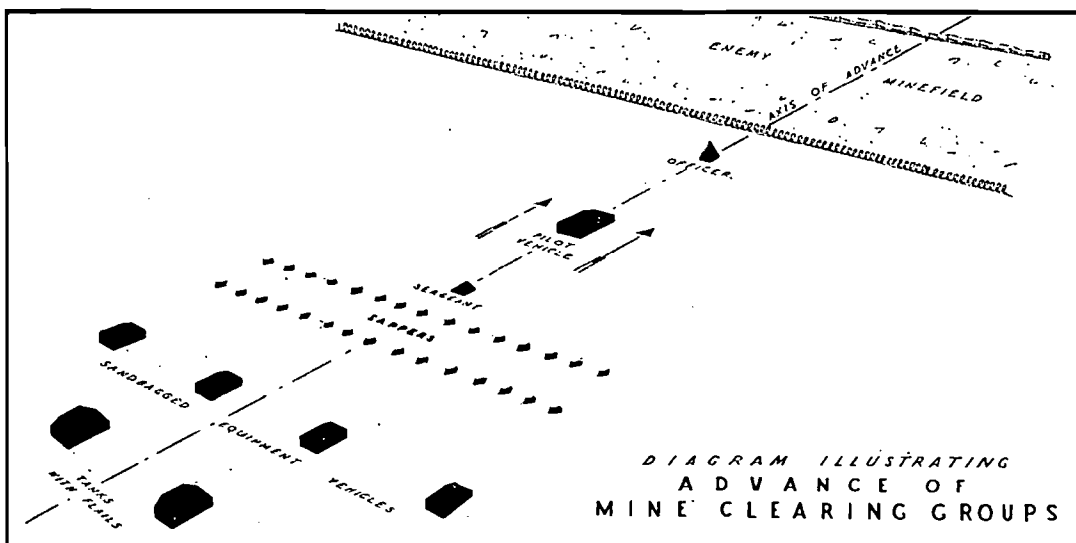
Next were the men responsible for disarming and lifting the mines, a risky business even for an expert (photos 44 and 45). To clear the lane, a sapper would crawl up to each marker. Then lying flat on the ground, he would carefully scrape away the sand covering the mine with his bare hands and check the sides and bottom for anti-handling devices (booby traps). If he could do it safely, he would then disarm the mine and any booby traps (remember, this was done at night!).<sup>59</sup> Each different type of mine required a different disarming procedure, with the Axis engineers employing at least 20 different types of mines. For example, the common Tellermine 35 (Photo 13) required the sapper to first engage the fuze safety by pressing a safety bolt into the fuze assembly, and then he lifted the mine from its hole. Next, he would unscrew and remove the Tellermine Fuze 35 from the mine. Finally, he disarmed the fuze by turning the arming dial from arm to safe (*scharf* to *sicher*).<sup>60</sup> Of the disarming process, Major Reid of the Royal New Zealand Engineers observed, "*The disarming of enemy mines and boobytraps was not a difficult or dangerous matter, provided the sappers remembered their training. We had a full range of all their mines and igniters (fuzes), and the sappers put in many weary hours handling them under all conditions, even disarming and neutralising them while blindfolded. We always maintained that if the enemy could arm a trap we could disarm it by working in the reverse process. The first thing done in every case was to insert a safety pin in the igniter, after which it could not function it was then a simple matter to remove the igniter or fuse. The German was very systematic, and we never found any variation in his methods, or in his explosive materials and appliances.*"<sup>61</sup> Lieutenant-Colonel McMeekan felt that, "*The lifting of mines is a comparatively simple business in daylight when not under fire, but even then, it requires a strict drill, and constant practice. Every man must recognize every type in use by the German, Italian, French and British Armies, and know how to immunise them. He must search below and around each one lest there be a booby trap wire attached. He must never take a step without looking for mines*

or trip wires. An exact drill must be followed if 100 per cent of the mines are to be found and lifted in the gaps marked. If casualties occur, spare numbers must be at hand to replace them instantly; every man has to know his neighbour's job.<sup>62</sup> After the mines had been disarmed, they were then carried by the sapper to the side of the cleared path and stacked. After the lane was cleared, explosives could be used to detonate the entire cache of lifted mines.<sup>63</sup>

When concealment was not important or when the mines were more than usually dangerous to handle (when they were booby trapped for example), they were often blown in-place. If several were close to each other, they could be destroyed by using a primer or detonating cord line main to save time. Alternatively, the sapper could attach a length of wire to the mine and move the rest of the men back a safe distance. If no explosion took place after he pulled the wire, he would lift the mine, disarm it and stack it by the side of the cleared path. However, if silence was required, he had to disarm the anti-handling device as well as the mine. After the lane was cleared, as above, explosives could be used to detonate any cached mines.<sup>64</sup>



**SKETCH 11. ORGANISATION OF ENGINEERS FOR CLEARING A GAP**



**SKETCH 12. ADVANCE OF MINE CLEARING GROUPS**



**PHOTO 43. SAPPERS PRODDING FOR ANTITANK MINES**

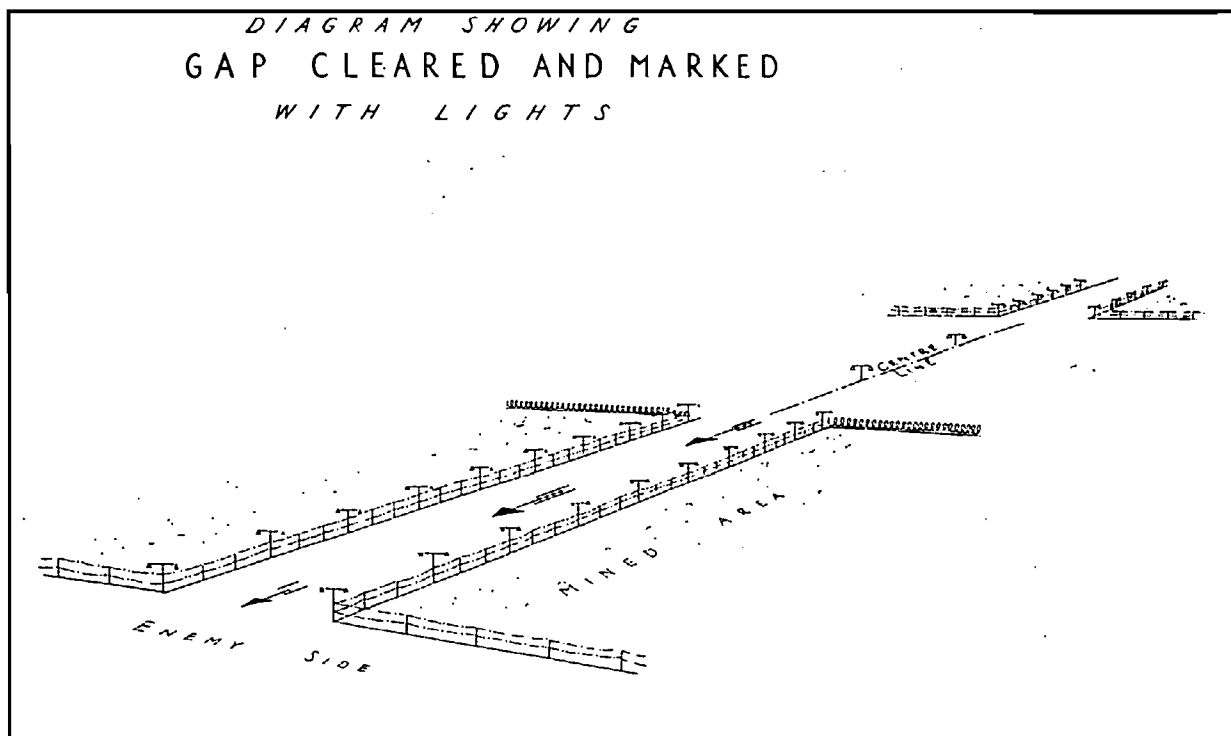


**PHOTO 44. 51<sup>st</sup> HIGHLAND DIVISION SAPPERS DISARMING GERMAN S-MINES**





**PHOTO 45. SAPPERS TRAINING TO DISARM VARIOUS AXIS MINES “BLIND”**



**SKETCH 13. GAP CLEARED AND MARKED WITH LIGHTS**

The final task of the two gapping parties was to mark the cleared path with a single strand barbed wire fence. Upon completion of the first lane, each side was fenced with T-shaped, iron pickets and barbed wire and lighted with directional lamps that could be seen only from the rear. These lamps used a flat, dry-cell battery, and were hung in pairs. The lamps displayed a green pinpoint light on the safe side and an amber light on the dangerous or un-cleared side; red lights were not used because they could be confused with vehicle and tank taillights. In all, the 8<sup>th</sup> Army would use 200 kilometers of marking tape and 88,775 lamps. (The lights were highly regarded by the infantry, who “acquired” them at every opportunity). For daylight, the lanes were marked with red and white painted signs that hung on the pickets (Sketch 13).<sup>65</sup>

Behind the main body followed No. 4 Party, which carried extra equipment and supplies. Due to the practical difficulties of attempting to make repairs at night, a 100 percent reserve of mine detectors was carried. In addition to the extra materials they carried, this party was expected to provide covering fire as needed and replacements in case the other elements of the breach force took any casualties. In addition to the sappers, there was an aid and litter team composed of one medic and four stretcher-bearers. As the sappers prepared the lanes, teams of military policemen were to establish traffic control centers. These centers were to be in direct communication with the forward headquarters, both for calling vehicles forward from a holding area and for controlling their movement in order to maintain a safe interval while in or near the vital minefield gaps. Eventually, follow-on engineers would widen the gap to 16-yards (14.6 meters) to the left. Sixteen yards was thought to be the minimum width that tanks needed to pass each other safely at night. Signal cables were to be laid on the right-hand side of the initial lane. To clear the 40-yard gap desired by the armor required 2 officers, 11 non-commissioned officers and either 85 troopers (in daylight) or 98 troopers (at night).<sup>66</sup>

Organization and communications were a critical part of the drill and had to be thoroughly worked out. The engineer officer in charge was supposed to have his own radio and to be in contact, through his divisional chief of Royal Engineers, with the brigade or divisional commander in direct control of the operation. Thus, the commander would have current information on the status of the breach, and be able to adjust the movements of units that had to cross through the breach. To facilitate this control, a staff officer was supposed to be detailed to this task. He was also supposed to have a radio and be in communications with his commander as well as a traffic control point that was supposed to be established about 500 meters from the opening of the breach. All units scheduled to use a breach were to assemble at this point and wait to be called forward.

This entire drill was known as the “quiet routine.”<sup>67</sup> It was done at a slow walk. Personnel were taught not to run under any conditions and also to lift their feet when walking to avoid trip wires. When it was demonstrated to the 8<sup>th</sup> Army’s senior leaders at Burg el Arab, it was felt that the main drawback of this drill was its slow pace. The determining factor was the amount of time to actually lift the mines. Even if the sappers had electronic detectors and were not interrupted by the Axis, rehearsals had shown that they could only clear about 120 meters an hour.<sup>68</sup> The time required could double if they had no mine detectors and had to probe the ground by hand. If the Axis offered significant resistance, the engineers’ rate of advance could be incalculably small.<sup>69</sup> Another drawback was the lack of a closely integrated vehicle recovery plan in the event that one was disabled in the cleared lane and blocked the breach. As a result of the many variables involved, it was found to be very difficult to synchronize the breaching of several gaps, since the irregular shapes of the minefields would require more time on some breach lanes than on others. In training, it was found that the clearing was best controlled as a series of coordinated advances.<sup>70</sup>

In addition to the intensive training to overcome *Generalfeldmarschall* Rommel’s mine boxes, the establishment of the 8<sup>th</sup> Army’s Mine Clearance School coincided with experimental trials that were conducted with new, standard equipment and the “ingenious” improvised devices produced by the engineers. These were intended to assist them in finding and detonating mines by mechanical or electrical means. Examples of these improvised devices include the Scorpion mine flail tanks, the Pilot Vehicles with Porcupine Rollers, and the Pram mine detector.<sup>i</sup>

### 5.4.3. COUNTERMINE EQUIPMENT<sup>ii</sup>

#### 5.4.3.1. SCORPION FLAIL TANK<sup>71</sup>

The tank, the brainchild of Royal Engineer Lieutenant-Colonel Edwin Swinton, had first appeared on the battlefields of the First World War as a combat engineer’s tool for breaching the German defensive fortifications on the stalemated Western Front. It was felt that if soldiers, armored only with cloth fatigues, could not do the job,

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<sup>i</sup> Historically, the unglamorous combat engineers, largely ignored for force modernization purposes, have often been forced to improvise solutions to various battlefield problems. See “After Action Report, Operation Restore Hope,” by William Schneck, Countermine Systems Directorate, US Army BRDEC, Ft. Belvoir, Virginia, 13 June 1994, pages 13-52 and particularly 56-57.

<sup>ii</sup> Interestingly enough, the earliest countermine equipment mirrored mankind’s earliest inventions: the knife and the probe, the wheel and the mine roller, the farm plow and the mine plow.

perhaps a tracked, steel-armored 'engine of war' could. After all, specialized assault engineering equipment had been used in siege warfare to breach hostile fortifications since antiquity by Alexander the Great and Julius Caesar (indeed, back to Ashurnasirpal II and the Assyrians). These early tanks were, in fact, more akin to the recently retired Combat Engineer Vehicle (CEV) than the medium (and later main battle) tanks that have become dominant since the beginning of World War II. These first tanks were 'sapper vehicles,' frequently crewed and commanded by engineer personnel.<sup>i</sup> They were designed to breach barbed wire obstacles, employ fascines (an ancient engineer implement for filling in gaps) and 'bust' hostile bunkers by direct fire. They were not intended to 'joust at tournament' with other main battle tanks, rather they were 'battlefield bullies' whose mission was to destroy anything that held up an advance. However, by 1942, the antitank mine had become such a threat to armored vehicles in North Africa that once again, sappers in cloth fatigues were forced to take the lead in the breach. Thus, producing the seemingly absurd situation of cloth-clad sappers clearing the way under fire for the thick-skinned tanks. For this reason, the questions of how to effectively clear or neutralize Axis mines were ones that continually exercised the minds of many combat engineers in the Middle East.

In 1941, Abraham S. J. du Toit,<sup>ii</sup> a motor engineer in civilian life and a sergeant in the South African artillery, developed a novel device that detonated mines by beating the ground with heavy chains or wire ropes driven by a rotating drum.<sup>iii</sup> A test rig was built on a truck and demonstrated in Pretoria, South Africa, where a short film was produced. After General Auchinleck saw the film, he thought it was a brilliant idea and sent Sergeant du Toit to England to pursue his invention in secrecy. The general felt that secrecy was vital in order to maintain the device's tactical surprise and value, but keeping it secret in the Middle East or South Africa was impossible. Sergeant du Toit called this new device a "threshing machine." It was intended to mount it on a tank chassis for combat use. Sergeant du Toit was soon promoted to major and was closely involved in the development in Britain of what became the Matilda Baron. Although the Baron never saw combat, it did provide the knowledge and experience that eventually led to the development and fielding of the highly successful Sherman "Crab" flail tank which was first used during the Normandy landings in 1944.<sup>iv</sup> However, these developments were unknown to the 8<sup>th</sup> Army and, therefore, of no practical utility to them. Nevertheless, before Sergeant du Toit had left for England, he had sketched out his idea for Captain Norman Berry, the South African Chief Mechanical Engineer for the 8<sup>th</sup> Army. They had met in Pretoria, South Africa in 1941 where Captain Berry had seen the prototype demonstrated. Captain Berry had immediately appreciated the value of such a mine-clearing device, but on his return to Cairo he was refused permission to work on it in the Middle East. Although this was where the device was most urgently needed, he was told that he could not work on it for two reasons - security and because it was already being developed in England.

Captain Berry was on the ordnance staff and a first rate engineer with an impatient streak. During a casual conversation with Brigadier Gaussen in the XIII Corps mess before the Battle of Gazala one evening in March 1942, they discussed the problems of getting through minefields. Captain Berry soon became tired of waiting for results

<sup>i</sup> Besides Colonel Swinton, General Elles, the first commander of the British Tank Corps was a Royal Engineer. The first US heavy tank battalions were created from the 65<sup>th</sup> Engineer Regiment, while the mixed branch crews of the German A7V tanks were given to the *sturmpanzer* of the famous *Sturmabteilung Rohr* for training. See *The Iron Cavalry*, by Ralph Zumbro, Pocket Books, New York, 1998, pages 92 and 112; *Treat 'em Rough! The Birth of American Armor 1917-1920*, by Dale E. Wilson, Presidio 1989, pages 51-52; and *The German A7V Tank and the Captured British Mark IV Tanks of World War I*, by Maxwell Hundelby & Rainer Strasheim, Haynes & Co. Ltd., London, 1990, pages 98-100. Indeed, *Sturmabteilung Rohr* provided one of the other key ingredients that was necessary for the birth of *blitzkrieg*, a small unit combined arms team that used mission type orders (what has come to be called *auftragstaktik*). See *Stormtroop Tactics, Innovation in the German Army, 1914-1918*, by Bruce I. Gudmundsson, Praeger, Westport, Connecticut, 1989, pages xi to xiii.

<sup>ii</sup> Question 2: Is there a photo available of Abraham S. J. du Toit, South African Army?

<sup>iii</sup> The concept of a flail tank may have been investigated by the British before the war, but was not developed at that time and was probably forgotten, see *Matilda, Infantry Tank, 1938-1945*, by David Fletcher, Osprey Publishing Ltd., London, 1994, page 37. However, it would appear that the Russians built the first prototype flail tank (based on a T-26 chassis) in late 1939 or early 1940 as a result of their bitter experiences attempting to breach the Mannerheim Line during the Winter War with Finland. Nevertheless, due to unspecified technical problems, the Russians did not further develop this concept. See *Soviet Tanks and Combat Vehicles of World War II*, by Steven J. Zaloga and James Grandsen, Arms and Armour Press, London, page 62.

<sup>iv</sup> For the "rest of the story" on the Sherman Crab flail tanks, see *The Great Tank Scandal, British Armour in the Second World War, Part I*, by David Fletcher, Her Majesty's Stationery Office, London, 1989, page 122.



from England and, on his own initiative, went ahead with some free-lance experiments while the 8<sup>th</sup> Army was still entrenched along the Gazala Line in the spring of 1942. There was no precedent for frontline troops to design and build a piece of equipment of such importance and complexity. Captain Berry's idea was to use two Ford trucks with the stripped chassis of one, its engine and controls still in place, hung in front of the other host vehicle and cantilevered so that it stayed above the ground. The differential was locked and two drums fitted in place of the rear wheels. Flails, originally made from wire cables with short lengths of heavy chain attached, were then fixed to the drums. As the host vehicle moved forward, the auxiliary engine on the stripped chassis was used to provide power to the rapidly turning drums so the flails hammered the ground and hopefully detonating all mines in its path. This work was done by No. 4 (G.H.Q.) Workshop. After General Rommel defeated the 8<sup>th</sup> Army at the Battle of Gazala and forced them to retreat back to the El Alamein line in the summer, Captain Berry was forced to hurriedly evacuate this unnamed experimental machine to Amirya, near Alexandria to prevent its capture by the Axis. As there were now more pressing matters at hand, no more work could be done on this project for some time.

Later, during the summer, Lieutenant-Colonel Mill Colman, a member of the South African Engineer Corps, developed what he thought was a novel idea for mine clearing. The idea had come to him when he noted a tracked vehicle driving by with a length of wire entangled in its track sprockets. With each revolution of the sprocket, the wire hit the ground with great force. Based on this, he thought that it might be possible to build a thrashing device that could detonate mines. Lieutenant-Colonel Colman sketched a rough diagram of his idea and, on 2 August, discussed it with Brigadier Ray, Commander of the South African Engineer Corps.

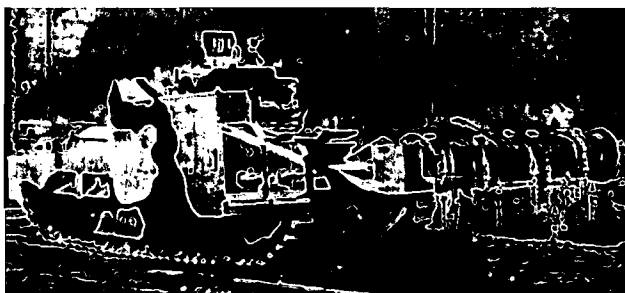
This led to further discussions within the 8<sup>th</sup> Army and, on 4 August 1942, Major L. A. Girling, Commander of the 21<sup>st</sup> South African Corps Field Park Company, was tasked with constructing the first experimental unit. They called it a "mine destroying device." Captain Berry, hearing of the latest rebirth of the flail idea, told Major Girling of similar previous developments and described how Major du Toit had been sent to England by General Auchinleck to work on a similar idea in conditions of tight secrecy. So secret, in fact, that the Allied command in the Middle East had forgotten about the matter. Captain Berry gladly unearthed the remains of his earlier experiment and handed the contraption over to Major Girling's team of engineers, consisting of himself, Captain G.J. Barry, Lieutenant Hofmann and Lieutenant C.D.B. Cramb.

These designers had been told that the flail device must be easily removable from the host vehicle. The tank to which it was fitted was expected to be able to breach a minefield and then quickly discard the flail and resume its traditional combat role. Major Girling quickly realized that this was impractical and ignored the requirement. As had often happened before and since, it was decided to press an obsolescent tank hull into the service of the combat engineers. In this case, the new flail device was to be mounted on the obsolescent Matilda, a slow, heavily armored infantry tank (18 kph cross-country speed) that was under-gunned (indeed, due to the short-sighted design of the Matilda, its 2-pounder could not be upgraded due to the tank's small turret ring). Unfortunately for the Allies, the Matilda suffered from several drawbacks. The demands of the war had forced the British Government to put it straight into production from its first immature prototype. Many of the vehicle's initial design faults remained unresolved two and a half years after its introduction because, given their desperate need for tanks, the government was unwilling to make any design changes that might decrease tank production. As a result, the promising design was never matured.<sup>72</sup> The 8<sup>th</sup> Army's Matildas still had a propensity to break down, a habit now aggravated by the extensive "wear and tear" incurred during hard combat service. Nevertheless, work on the prototype flail tank commenced within twenty-four hours and by 6 August, the first mock-up was completed. After Major Girling's design team conferred with Brigadier Ray and Lieutenant-Colonel Colman, several design modifications were identified and agreed to.

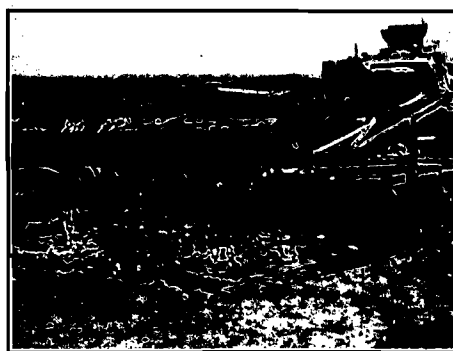
This first flail prototype was christened the Durban Mark I, after Lieutenant-Colonel Colman's hometown in South Africa (photos 46 to 53). The Durban Mark I incorporated many of Captain Berry's ideas, including an auxiliary 105-horsepower Ford V8 engine mounted in a sponson (an armored box) on the right hand side of the Matilda Tank's hull. Initially, the design called for the more powerful Lincoln Zephyr V12 engine, however, this could not be acquired in sufficient time to meet their ambitious schedule. A shaft was used to transmit the power from the auxiliary engine along the roller supports to a level box and then to the drum suspended above the ground. The horizontal flail rotor was held by two lattice girder arms about six feet in front of the tank and three feet above the ground. The rotor covered the entire width of the tank and was rotated in the same direction as the tank's movement, at a speed of approximately 100 revolutions per minute. The rotor was equipped with 24 flails, or chain assemblies, that hit the ground with a contact length of approximately 20-cm. On later versions, fielded after the

Second Battle of El Alamein, the boom that carried the rotor was modified so that it could be elevated and depressed by means of hydraulic cylinders to aid in mobility when not in use.

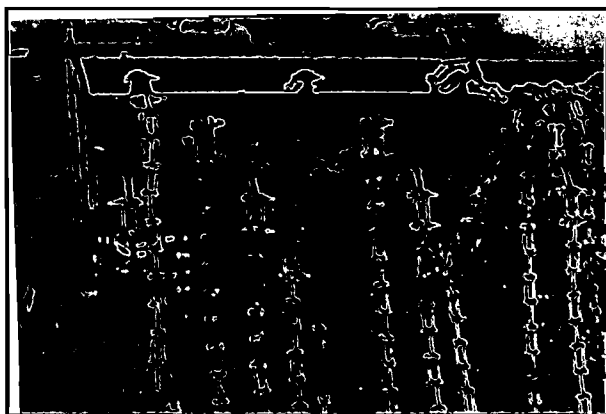
The first tests in August were carried out behind the cover of a long, high screen of camouflage netting to shield the new device from prying eyes. General Richardson, Brigadier Kisch, Brigadier Ray, Lieutenant-Colonel Colman and other senior officers attended. The tests revealed several faults, the most notable of which was the poor quality of the locally purchased bearings that failed under the exceptionally heavy stress. Of a demonstration on 20 August, Brigadier Kisch wrote, "*Inspected abortive demonstration by C.E. 30 Corps of mine thrashing machine with flails of chain. The idea is promising, but mechanical difficulties are considerable.*" The results, however, were sufficiently encouraging for him to promise his full support and further assistance to the project. The design team of engineers and mechanics, predominantly from South Africa,<sup>73</sup> continued to nurse their creation through its many initial teething problems. After the machine was modified, it was re-tested on 22 August, this time using various weights, lengths and combinations of chains and cables. The designers also incorporated other (unspecified) modifications.



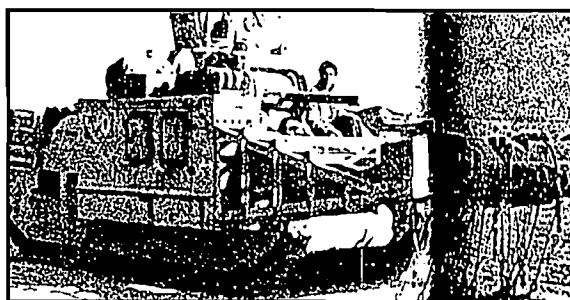
**PHOTO 46. PROTOTYPE "SCORPION" MINE CLEARING FLAIL TANK**



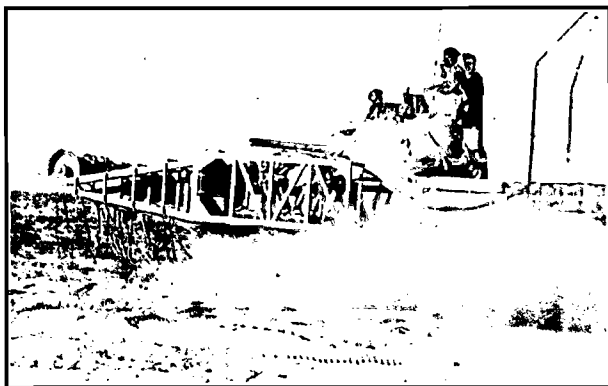
**PHOTO 47. SCORPION**



**PHOTO 48. CLOSE-UP OF THE SCORPION'S FLAIL ROTOR**



**PHOTO 49. A VIEW OF THE SAPPER'S ARMORED BOX FROM WHICH THE FLAIL WAS OPERATED**



**PHOTO 50. SIDE VIEW OF THE SCORPION**



**PHOTO 51. CLOSE-UP OF THE FLAIL IN OPERATION**



**PHOTO 52. ANOTHER VIEW OF THE FLAIL IN ACTION**



**PHOTO 53. A FLAIL DETONATES A MINE**

After the second test, Major Girling's team continued to refine their design. On 12 September, the Durban Mark I was demonstrated for the 8<sup>th</sup> Army's corps commanders and their chief engineers. Generals Alexander, Commander-and-Chief, Middle East, Montgomery, Commander 8<sup>th</sup> Army, and Morshead, Commander 9<sup>th</sup> Australian Division, witnessed Scorpion demonstrations and were impressed with its capabilities, considering the short amount of time invested in the project. Major Girling was congratulated for bringing the project to such a successful conclusion so quickly. Brigadier Ray remarked that, in appearance, the prototype resembled a scorpion and the name stuck. General Montgomery, a deeply religious and austere man, felt the name appropriate and quoted from the First Book of Kings (Chapter 12, Verse 14): "*My Father has chastised you with whips, but I shall chastise you with scorpions.*" Having observed the new, unprecedented invention, General Montgomery said that he wanted twelve for the coming attack. Brigadier Kisch had explained that the production of so large a number would have to be approved by General Headquarters and that it would mean suspending other production work. To this, General Montgomery replied, "*Don't belly-ache, order two dozen.*" The next day Brigadier Kisch ordered the fabrication of an additional twenty-four of the new "Scorpion" mine destroyers, combined with the first prototype, this would provide the 8<sup>th</sup> Army a total of twenty-five Scorpions for Operation Lightfoot.

At this point, responsibility for the Scorpion effort was transferred to the 7<sup>th</sup> Base Ordnance Workshops of the Royal Electrical and Mechanical Engineers (REME) in Alexandria where the flails were to be produced, with Major Girling sent along to serve as a consultant on the project. While the designers made their final modifications,



two draftsmen spent a week preparing the working drawings from which the twenty-four Scorpion Mark II prototypes were assembled.

On 21 September, General Alexander watched as the new Scorpion was successfully tested, on hard ground, against fully charged mines. All of the previous tests had been against smaller charges. On average, each Tellermine detonation destroyed only one chain. During operation, it was found that each Scorpion could typically destroy up to 14 mines before the rotor had to be re-dressed with new chains. The Scorpion's flail was found to operate more by a digging action, rather than with a true beating action. The chains were primarily vertical and moving horizontally at the moment of impact with the ground; therefore, only the tips of the chains affected buried mines. The digging action of the chains sometimes caused unexploded mines to be thrown onto or against the host vehicle. If the tank driver opened his hatch to look out, he would be deluged with sand, and bombarded by stones, scrub and even the occasional unexploded mine! Although the Scorpion's tankers inside the hull were virtually immune to mines detonated by the flail, it could not have been a pleasant ride for the volunteer sapper clinging to the side of the tank while trying to operate the flail's engine. Additionally, the flail's drum proved to be prone to damage from mines that exploded directly beneath it. Overall, the device proved capable of clearing an average of 75% of the antitank mines from its path to a cover depth of 10 centimeters. This figure was, of course, subject to considerable variations depending on the mine type, local terrain irregularities and soil conditions. The only thing that was certain was that the behavior of the mines was unpredictable.<sup>74</sup> More tests were conducted against mines activated by trip wires and various other means. Tests also showed that the maneuverability of the Matilda was impaired as a result of the additional weight of the device (about 5,000 kg), while the operating-speed of the early Scorpions was a mere .8 kilometer per hour (later versions reached as fast as 2.5 kilometer per hour). At this speed, the Scorpions would be a comparatively easy target for Axis gunners. Although slow, this was still almost five times faster than a party of sappers clearing a path through a minefield by hand.<sup>74</sup>

Perhaps the most unsatisfactory feature of the early flail was the under-powered auxiliary engine the designers were forced to use as the preferred V12 was not available. This auxiliary engine was housed in a small armor-plated box that only had enough space for the motor and the operator but not enough for the circulation of sufficient cooling air for the radiator. These early flails could only stand the strain of continuous operation for about 500 meters at a time, beyond that, it had a tendency to overheat or clog with dust. To address the problems with overheating, Brigadier Kisch suggested that eighteen-liter header tanks be fitted to assist with cooling. His idea reduced this problem. With additional improvements, it was hoped to eventually develop the flail to the point that it would prove satisfactory under all operating conditions. Unfortunately for the engineers, time was short and the remaining developmental teething problems had to be accepted for the time being. According to Major Reid of the New Zealand engineers, *"This idea had great possibilities, especially from the sappers' point of view, as if we could get tanks to clear gaps through minefields we could anticipate a much longer life."* Compared to the other available alternatives such as rollers and hand clearance, the flail-type mine clearance system appeared to be far superior. Therefore, the engineer officers decided that overall; the new Scorpion had passed its tests in an acceptable manner and could be used effectively in combat. However, because of the lack of adequately trained crews to operate the flail and the trials, which had not been completely convincing, it was decided to place no great reliance on the flails for the coming battle.<sup>75</sup> Rather, it was directed that the Scorpions should only be used in an emergency, such as when an unexpected minefield was encountered and no sappers were available, or where Axis fire prevented the sappers from executing their standard minefield breaching drill. Therefore, Brigadier Kisch decided that the flails were only to be used as a last resort and not as a primary means of breaching the "Devil's Gardens."<sup>76</sup>

On 6 October, the first "production" model Scorpion was delivered by the 7<sup>th</sup> Base Ordnance Workshop, followed by two more the next day. At this point, it was decided to man the Matilda tanks, on which the "Scorps" were built, with personnel from the British Royal Armour Corps (RAC) serving in the 42<sup>nd</sup> and 44<sup>th</sup> battalions,

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<sup>74</sup> Later in Europe, it was found that in soft ground, the impact of the bob weight was deadened, or if the ground was frozen hard the bob weight would bounce off the surface without transmitting sufficient energy to the mine fuze. However, mines in frozen ground were likely to be inoperative as far as ordinary tracked or wheeled vehicles were concerned any way. There was one case of a lane which had been swept at Le Havre, France and had been used by dozens of vehicles going forward, but a scout car coming back down the lane in the opposite direction detonated a mine in the same lane and was destroyed. The mine must have been buried a little deeper than usual and subsequent tanks passing over had consolidated the ground in such a way as to shield the detonator which remained unexploded until the direction of thrust on it had been reversed. It was also discovered in Europe that the host vehicle's floatation and trim was significantly impaired by the addition of the weight of the device to the front of the vehicle. *The Story of 79<sup>th</sup> Armoured Division, October 1942- June 1945*, privately published, Germany, July 1945.

Royal Tank Regiment of the 1<sup>st</sup> Army Tank Brigade.<sup>i</sup> The 44<sup>th</sup> Battalion provided six officers, one noncommissioned officer, and thirty-nine enlisted. Apparently all of these Royal Armour Corps personnel were placed under the temporary command of Major Drury of the 44<sup>th</sup> Battalion, Royal Tank Regiment.<sup>77</sup> While the four crewmen from the Royal Armour Corps road into battle behind the protection provided by the thick hull of the Matilda, the Royal Engineers from the field companies assigned to the minefield task forces, were responsible for providing the fifth crewmember. This sapper, who was a volunteer, operated the auxiliary flail equipment. These volunteers rode outside the thickly armored hull and inside the thinly armored auxiliary engine compartment, which he shared with the Ford V-8. From here, he operated the flail. He was also responsible for attempting to restart the auxiliary engine if it stalled. This was most likely to happen if barbed wire became wrapped around the drum. Undoubtedly, this was a hot, noisy, and cramped job but, even though it was not exactly safe, there was no shortage of volunteers. Indeed, the dust was so bad that the sappers frequently had to wear gas masks.<sup>78</sup> As one soldier, Sapper Docherty, who operated one of the Scorpions at El Alamein observed, it was preferable to lifting mines by hand, especially under mortar fire.

By 10 October, Lieutenant-Colonel Colman was busy compiling training and operating notes for the various units who would be using the Scorpions. According to his concept, the Scorpions could be brought forward to create a lane after the edge of a minefield had been identified (by pilot vehicles, roller tanks, dismounted engineer reconnaissance teams or burning vehicles). During combined arms breaching training, the flails were found to perform indifferently. They could not beat a wide enough lane for the tanks unless multiple passes were made. At first, the engineers tried to use a troop of Scorpions in echelon. However, in the dust and smoke raised by the flails, this proved to be quite impossible, in spite of efforts to develop station-keeping techniques and equipment.<sup>79</sup> Finally, it was determined that a Scorpion should flail a path across a minefield, then turn around and flail back toward the friendly side of the minefield; this was called the “double run.” This was to be done using a compass and a stopwatch.<sup>ii</sup>

The Scorpions were organized into troops of three or four vehicles. By 17 October, General Horrock’s XIII Corps had received six Scorpions, which it allocated entirely to the 7<sup>th</sup> Armoured Division. A troop of Scorpions was also attached to each of the four assault divisions of XXX Corps (thirteen total). The X Corps received six Scorpions, however, the troop allocated to the 10<sup>th</sup> Armoured Division was “loaned” to the 2<sup>nd</sup> New Zealand Division for the first night of the attack. (See Appendix J for a detailed breakout of the task organization).<sup>80</sup>

Unfortunately, these early flails, as well as their Matilda host vehicles, were so mechanically unreliable that most of the gaps the sappers breached through the mine boxes during the Second Battle of El Alamein were still made by hand. Nevertheless, despite their shortcomings, the Scorpions would come as quite a shock to some of the Axis soldiers who confronted them. Italian prisoners (probably paratroopers from the Folgore Division) were reportedly, “*less frightened by the barrage than by this strange phenomenon—a slowly advancing pillar of dust, out of which came dreadful noises of clanking, grinding and rattling of chains. They had no idea what it was.*”<sup>81</sup>

#### 5.4.3.2. MINE ROLLERS

The possibility of producing mine rollers (and assault bridges) which could be used by armored vehicles was first explored by Major Giffard le Q. Martel, Royal Engineers, in the First World War. Major Martel had served as a staff officer for General Elles, Royal Engineers and the senior British tank commander in the First World War. Major Martel was assisted by Major C. E. Inglis from the Engineer-in-Chief’s branch at General

<sup>i</sup> Possibly also personnel from the 6<sup>th</sup> Battalion, Royal Tank Regiment were included in this group (see The Tanks, The History of the Royal Tank Regiment and its Predecessors Heavy Machine Gun Corps, Tank Corps and Royal Tank Corps, 1914-1945, Volume Two, by Captain B. H. Liddell Hart, Cassel, London, page 225). However, such is specifically not mentioned in “War Diary, 6<sup>th</sup> Royal Tank Regiment, October, 1942,” “44<sup>th</sup> RTR War Diary 1942,” or A History of the 44<sup>th</sup> Royal Tank Regiment in the War of 1939-1945, Part I, England and the Middle East, 1939-1943, by A. G. Brown and K. C. E. Dodwell, page 77.

<sup>ii</sup> There are few recorded instances of Scorpions completing the ‘double run’ during the Second Battle of El Alamein, one that nearly did was about half way back when it encountered some Crusaders trying to push forward to the fighting and was forced off the safe lane. It was knocked out by three mines that the sappers had lifted and laid alongside the gap. Both tracks were blown off. The Great Tank Scandal, British Armour in the Second World War, Part I, by David Fletcher, Her Majesty’s Stationery Office, London, 1989, page 122. Unfortunately, this source does not state which unit was involved in this incident. See also “Notes on the Scorpion, A Minefield Clearing Device,” Military Reports on the United Nations, No. 6, Military Intelligence Service, War Department, Washington, D. C., 15 May 1943, page 33.



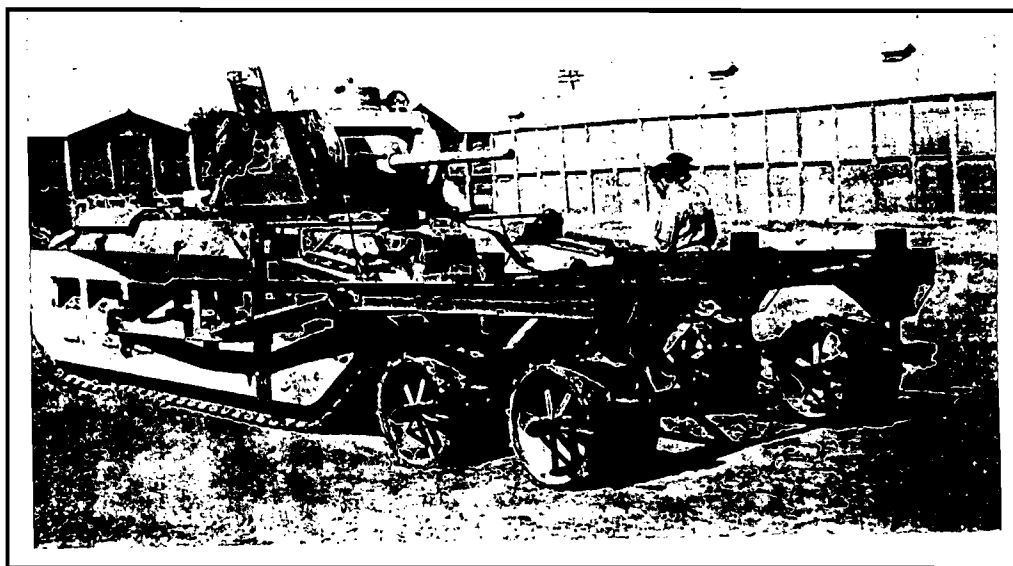
Headquarters, a Professor of Engineering at Cambridge (he had designed a prefabricated tubular mobile bridge to carry tanks across a clear span of 100 feet). Three special tank battalions, one of them commanded by Major Martel, were formed at Christchurch in Hampshire in 1918. Each was equipped with Mk V tanks that were designed to accept either mine rollers or to push/pull mobile bridges. However, the armistice came before these units became operational. Nevertheless, Major Martel was able to continue trials with the one remaining unit that became known as the Experimental Bridging Company. This unit was eventually transitioned to civilian control, becoming the Experimental Bridging Establishment in 1925.<sup>82</sup> Nevertheless, the idea of special purpose engineer tanks was largely ignored until the late 1930s. In 1937, influenced by a French design, the British Anti-Tank Mine Committee conceived of the Anti-Mine Roller Attachment (AMRA).<sup>83</sup> This device consisted of a framework and suspension carried by four spring-mounted and castoring rollers positioned in front of each track of the host vehicle. The objective was to detonate any mine before the tank could run over it. This device was attached to the tank by two brackets, bolted to each side of the vehicle. It could be jettisoned when not required. Various versions of this device (AMRA Mk Ic through Mk Ic) were made for use with the following tanks: Covenanter, Matilda, Valentine, Crusader, and Churchill.<sup>i</sup> The versions for the Matilda (photos 54 and 55) and Valentine (Photo 56) were employed operationally in the Middle East. Sometimes called the “Spiked Fowler Roller,” after its manufacturer in Britain, it appears to have been used during the upcoming battle by at least one unit, the Valentine tanks of the 40<sup>th</sup> Battalion, Royal Tank Regiment.<sup>84</sup> This unit fought under the command of the 9<sup>th</sup> Australian Division.

The 8<sup>th</sup> Army also had experimented with a locally improvised mine roller pushed by a tank earlier in the North African campaign for detecting minefields. It was called a “Scarab” tank. On the Scarab, beams were fitted to each side of a tank and extended forward of the hull. Improvised rollers were then fitted to the ends of the beams by an arrangement of cross members and bridles. The rollers were made from forty-four gallon (about 166 liter) drums filled with reinforced concrete and weighing about 400 kg each. A large number of steel rods protruded about twenty centimeters above the surface of the rollers, giving them the appearance of a sheep’s foot roller (earth compacting equipment) and their nickname, “Porcupine Rollers” (Photo 57). In combat, the Scarab tanks were expected to deploy into an arrowhead formation and lead an advance into a suspected mined area. Any Scarab that activated an antitank mine would stop and wait at the point of detonation. Those Scarab tanks whose rollers did not detonate any mines were presumed to have found a gap in the minefield or a bypass. After a lane or bypass had been found, the rest of the Scarab tanks in the unit would exploit this by backing out of the minefield and then crossing the obstacle at the site of the gap. Any following units would also use the same gap or bypass. The “Porcupine Rollers” themselves were expendable; they were only designed to detect the leading edge of a minefield. There was no intention of re-using one after it had detonated a mine. Furthermore, it was assumed that an exploding mine indicated the leading edge of a minefield and not one that was deeper in the field. Given the fact that the probability of running over a mine in the first row of the typical German minefield (density of 1 mine per meter) was about 30% (depending on the width of the tank’s track) and that these early rollers probably detonated only about half of the antitank mines that they encountered, there was considerable risk involved in placing too much reliance on them. It was also found that the rollers’ mine detection/clearing performance was even less when they were used on hard ground, especially when the mine’s pressure fuze was buried below the level of the surrounding ground. Additionally, the rollers slowed down the host tanks from a cross-country speed of 15 to 30 kph (depending on which type of tank was the host vehicle and the terrain) to a slow walking speed of less than 3 kph, resulting in a reduction of at least 80 to 90 percent of their march rate.<sup>ii</sup> Although the rollers were a good concept, the British armor community quickly rejected them because they did not function as hoped.

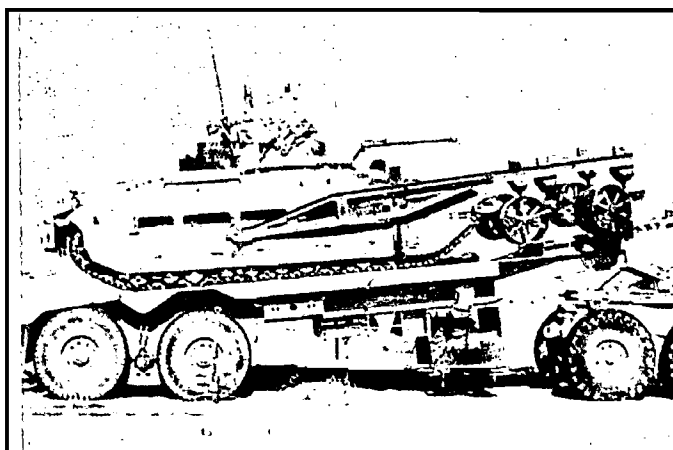
<sup>i</sup> 140 were manufactured for the Matilda. *Matilda, Infantry Tank, 1938-1945*, page 36.

<sup>ii</sup> The prototype US T-1 mine rollers, also influenced by the same French design, but with better ground conformance due to its use of floating disks, could be operated at about 2.5 kph. It proved to be approximately 50% effective to a cover of 75 mm. Soft ground could immobilize both roller and tank; thus additional retriever assets were required. Tank maneuverability was seriously hampered and the power available from its M3 Grant host vehicle was inadequate. See “Historical Excerpts of Mine Warfare Research and Development, 1942-1959,” by H. C. Smith, Report 1924 (DTIC # AD830470), US Army Mobility Equipment Research and Development Center, Ft Belvoir Virginia, March 1968, pages 50-51. Most of the mine rollers currently in use are based on the blast resistant Russian Mugalev Rollers that were introduced about this time on the Russian Front. *Soviet Tanks and Combat Vehicles of World War Two*, page 190.

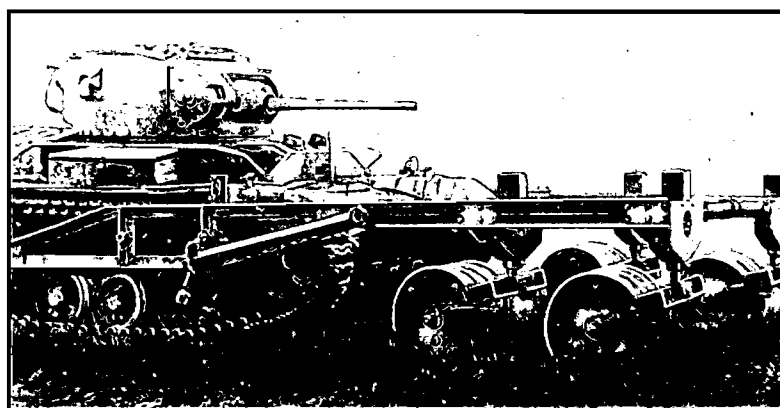




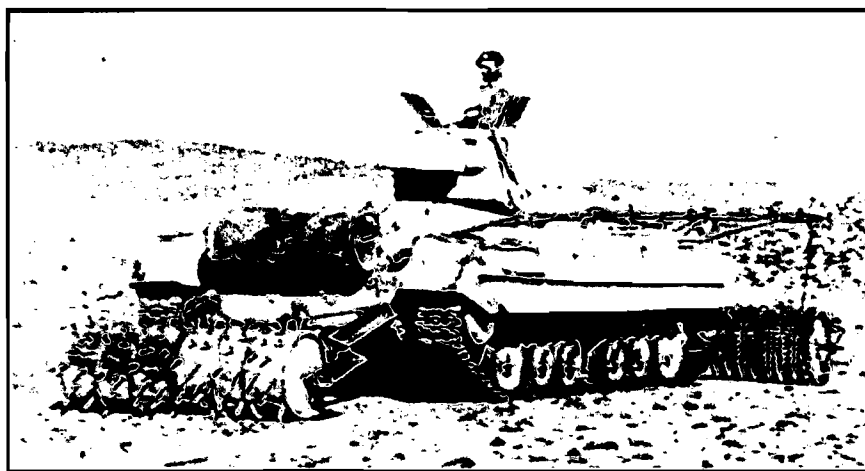
**PHOTO 54. THE ANTI-MINE ROLLER ATTACHMENT (AMRA) ON A MATILDA TANK**



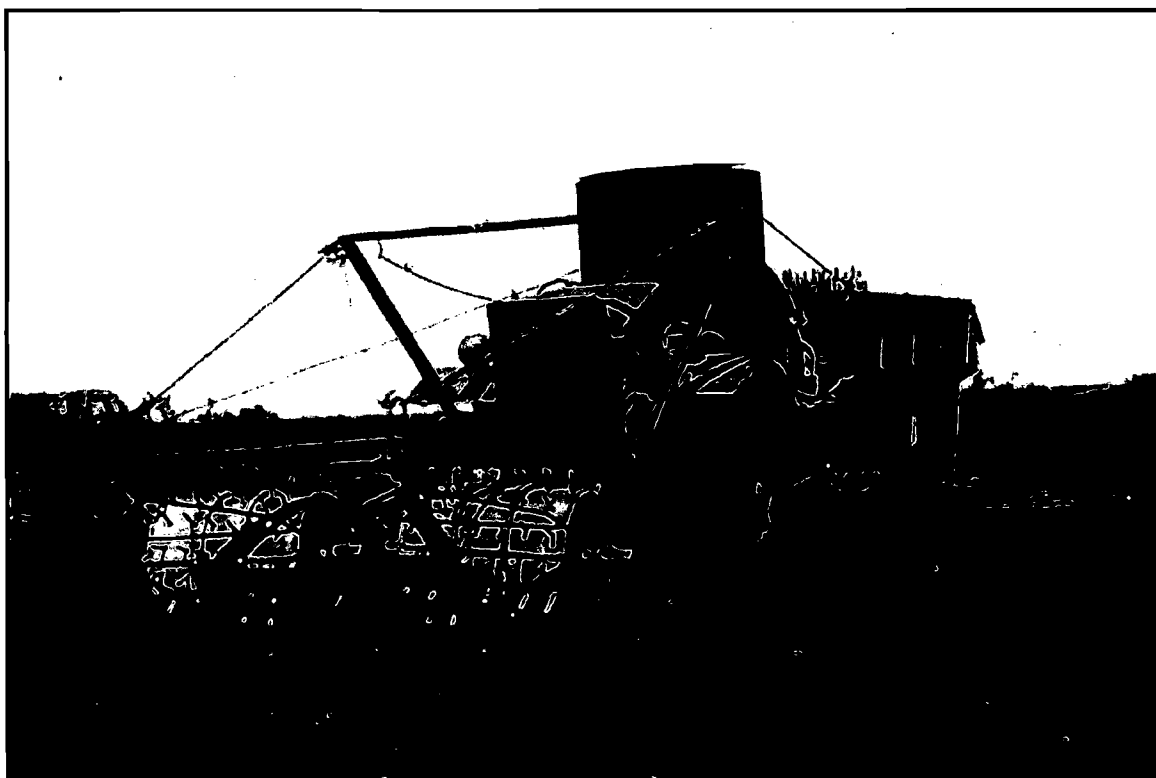
**PHOTO 55. ANOTHER VIEW OF THE AMRA OR "FOWLER ROLLER" ON A MATILDA TANK**



**PHOTO 56. A VALENTINE TANK FITTED WITH THE AMRA**



**PHOTO 57. A VALENTINE TANK FITTED WITH AN IMPROVISED “PORCUPINE” MINE ROLLER**



**PHOTO 58. A PILOT VEHICLE FITTED WITH AN IMPROVISED “PORCUPINE” MINE ROLLER**  
(Note the replacement rollers visible in the bed of the truck)

The engineers from the British Commonwealth, however, did not abandon the concept of mine rollers. Rather than give up and go back to probing for mines under fire with a bayonet, the sappers worked to minimize the shortcomings of their designs and to develop effective techniques for using them. Instead of attaching the rollers to Scarab tanks, the engineers decided to attach them to their own trucks, creating what they called a “pilot vehicle” (Photo 58). Major Murray Reid, Commander of the 8<sup>th</sup> New Zealand Field Company, described these as follows: *“The latest piece of equipment to arrive was a Pilot Vehicle. It consisted of an old truck with no cab, on which had been built a sandbagged box to protect the driver and his mate. The truck was driven backwards by remote controls from the protection of this box, and pushed three big spike-studded concrete rollers, which were held in place by*

arms projecting from the rear of the truck. The spikes projected about six inches from the rollers and pressed into the sand to explode any mines touched. The machines were designed to find minefields and not to clear tracks through them, so, to prevent our trucks from being damaged on unmarked fields, the Pilot Vehicles were to lead the way. A second one was received a day or two later, and was in no better mechanical order than the other one. They were both in a deplorable condition, and kept our fitters working long hours to put them into satisfactory running order. Packing the rollers for transport to the front area was a problem, as each one weighed twelve hundred weight (a hundred weight is equal to one hundred US pounds or 45 kilograms), and without a crane of any sort the poor transport sergeant was at his wits' end to know how to load the rollers on to the trucks. In the past we had all sorts of difficulties to overcome, and had never yet been beaten, so it was not long before a ramp was made and the rollers rolled into their respective trucks."<sup>85</sup> Thus, the 8<sup>th</sup> Field Company was issued two Pilot Vehicles for the upcoming attack.

In the 9<sup>th</sup> Australian Division, the engineers of the 2/24<sup>th</sup> Field Park Company, Royal Australian Engineers, fabricated ten 'Pilot Vehicles,' using a four-wheel-drive three ton truck. To these vehicles were attached three rollers of 166 liter (44-gallon) drums filled with concrete. These sandbagged trucks, again driven in reverse, pushed a set of boom mounted rollers ahead of the wheels with another towed roller to clear the center line.<sup>86</sup>

In the weeks before the Second Battle of El Alamein, the 13<sup>th</sup> Field Company, South African Engineer Corps, also exploited the roller idea. The 13<sup>th</sup> Field Company adapted it for use with their three-ton truck. Once again, its function was to detect the leading edge of a minefield by exploding a mine. In late September, the 13<sup>th</sup> Field Company demonstrated the rollers to General Daniel Pienaar, Commander of the 1<sup>st</sup> South African Division.<sup>87</sup> During a demonstration for their leadership, the South African engineers placed two German Tellermines under the rollers of a pilot truck and then command detonated the mines. As the explosion blew the Porcupine Rollers high in the air; they rotated about their attachment points and landed on the truck, smashing its chassis. It was found that even the explosion of a single mine lifted both rollers and the back wheels of the truck a meter off the ground. Nevertheless, the general liked the idea and ordered their fabrication for use by his division in the upcoming attack. It would appear that Major Brand's 19<sup>th</sup> South African Field Park Company fabricated at least six sets of these rollers, while the 22<sup>nd</sup> Corps Field Park Company also fabricated some.<sup>88</sup> Major Moore reported that, "*Extracts of some notes on the Tactical Employment of Pilot Vehicles, compiled in September 1942, speak for themselves: 'Pilot vehicles are one-shot vehicles. Drivers of pilot vehicles are subject to considerable nervous strain of a peculiar nature.'*"<sup>89</sup>

#### 5.4.3.3. EXPLOSIVE BREACHING

As General Freyberg observed, "*Any attack on a prepared position must anticipate encountering minefields and wire. It is considered that the Bangalore Torpedo remains the best method of enabling infantry to get through wire entanglements with booby traps, and they should be carried with the leading waves of the attacking troops.*"<sup>90</sup> After considering the effectiveness Russian barbed wire obstacles against the Japanese during the Siege of Port Arthur in the Russo-Japanese War of 1904, Captain McClintock of the Bengal, Bombay and Madras Sappers and Miners had invented this pipe bomb in 1912. It took its name from the city of Bangalore India where it was developed. The original torpedo was 5.5 meters long and held 27.2 kilograms of dynamite.<sup>91</sup> Another method of explosive breaching considered for use at El Alamein, was the use of high explosive rounds fired by 4.2-inch mortars to detonate mines. These mortars were assigned to the 66<sup>th</sup> Mortar Company, Royal Engineers, who were attached to the 9<sup>th</sup> Australian Division. However, this method was not used.<sup>92</sup>

The demolition "Snake" was an overgrown Bangalore torpedo that was pushed by a tank into a minefield and then detonated to breach the obstacle. These also appear to have been available to the 8<sup>th</sup> Army. The Allies' demolition snake appears to have been based on an earlier German field expedient called a *Ladungsschieber*. This was a 25-meter long set of *Gestreckte Ladungen*, improvised Bangalore torpedoes made (according to the manual) of 5-meter lengths of 16-gauge steel pipe and loaded with blasting gelatine or other suitable explosives. These *Gestreckte Ladungen* were then supposed to be mounted on 5 sets of improvised wheels that placed the *Gestreckte Ladung* 35cm above the ground and allowed two dismounted pioneers or a vehicle to push the *Ladungsschieber* into a minefield. One *Ladungsschieber* was supposed to be able to clear a four to six meter wide breach. Larger breaches were possible by varying the design and fabrication of the device. Two *Ladungsschieber* with four meters between them (presumably with bracing between them to maintain this spacing, but the manual does not state this) would



clear an eight to ten meter wide breach, while longer breaches could be created by adding more *Gestreckte Ladungen*.<sup>93</sup>

The Allied version of the demolition snake was first developed by a Canadian combat engineer named Major A. T. MacLean<sup>i</sup> of the 11<sup>th</sup> Field Company (stationed in England at the time) starting in October 1941. The Canadian snake was originally nicknamed the “Worthington Wiggler,” after F. F. Worthington, M.C., M. M., commander of the 1<sup>st</sup> Canadian Tank Brigade. It consisted of sections of 3 inch (76mm) diameter pipe loaded with explosive, which could be coupled together in lengths up to 400 feet. It was supposed to be towed to the edge of a minefield by one tank and then it was to be pushed, as a unit, ahead of another tank across a minefield. The subsequent detonation would clear a vehicle wide path through the field. It was demonstrated successfully in February and March 1942.<sup>94</sup> Although the “Snake” was apparently available to the 8<sup>th</sup> Army, no reports of their use during the Battle of El Alamein have been found. An American observer with the 8<sup>th</sup> Army reported, “*The Snake is not considered to be suitable for extensive use in the Middle East because the results obtained with it depend so largely upon terrain. In hard ground suitable gaps in minefields can be cleared, but in soft sand, it is quite possible that mines 2 or 3 feet from the Snake will not be detonated.*”<sup>95</sup> It was first used in combat by Valentine tanks in the latter stages of the North African campaign.<sup>96</sup>

#### 5.4.3.4. ELECTRONIC MINE DETECTORS

In manual breaching, before the mines could be removed or destroyed, they had to be located. Visual detection of mines was subtle but highly effective. It was difficult for the Axis engineers to camouflage work done while laying mines at night over a large area. Providing that it is not too dark, alert Allied sappers were able to observe signs of their presence. Sometimes, the wind would expose part of a mine, other times, artillery shelling might bring a mine to the surface. However, locating all of the individual mines was a different matter. For this reason, most nations augmented this capability by probing with a bayonet or similar pointed instrument and introduced electronic mine detectors.<sup>97</sup>

Although the German, Russian, French and Italian armies had entered the war with electronic mine detectors, the British (like their American cousins) did not.<sup>98</sup> The lack of an electronic mine detector in British service at the start of World War II is somewhat surprising. In fact, members of the Royal Engineers had improvised an electronic mine detector, based on electrical induction, and mounted it on a vehicle to counter mines in Palestine in 1932. However, this innovative concept was ignored by the British Army.<sup>ii</sup> As a result, during World War II, the Royal Engineers were forced to play “catch up” in this area. The first electronic mine detector used by the British in North Africa was the “Goldak” detector (Photo 59). These were commercial devices manufactured in the United States for locating buried utilities.<sup>99</sup> It operated on the principle of two balanced coils; any change in inductance, caused by a nearby metal object, set up an oscillation that could be heard in the earphones as a “ping.” The Goldak, which first saw service in the summer of 1941, was neither sufficiently robust nor reliable for extended combat use. Fortunately for the Allies, the more reliable Polish Mine Detector (photos 60 and 61) entered low rate production in 1941 and was accepted into service in March 1942 and began to arrive in theatre shortly thereafter. This detector had been invented by Captain J. S. Kosaki, with the assistance of Lieutenant Kalinowski, both of the Polish Free Forces then training in Scotland. The Polish detector operated on the same principle as the Goldak.<sup>iii</sup> These detectors made mine detection much faster than the tedious hand probing techniques that the sappers had been forced to use previously. Unfortunately, there was still a desperate shortage of this equipment in the days leading up to the Second Battle of El Alamein. Of the 499 mine detectors (mostly Polish type) on hand, 202 were assigned to XXX Corps, 117 to XIII Corps, and 180 to X Corps.<sup>100</sup> While the normal issue of detectors was eight per field squadron, for Operations Lightfoot and Supercharge, it was increased to 24 per squadron (at least in the 1<sup>st</sup>

<sup>i</sup> Another reference, *The History of Landmines*, by Mike Croll, Leo Cooper, Great Britain, 1998, page 71, credits the ‘snake’ to Lieutenant-Colonel Willot (also of the Canadian Royal Engineers).

<sup>ii</sup> Before the Second World War, the British Army in the field developed a number of expedient solutions to many problems in combat engineering, however, these ingenious devices were typically used for the duration of a particular campaign and then forgotten. *The History of Landmines*, page 35.

<sup>iii</sup> These detectors proved acceptable and remained in service with the British Army for many years after the war. See *British, French and Italian Mine Warfare Equipment*, TM 5-223D, Department of the Army, Washington D. C., May 1952, page 68, and *Alamein*, page 95.

Armoured Division).<sup>101</sup> However, some units were still short detectors, the 9<sup>th</sup> Australian Division, for example had only 36 detectors.<sup>102</sup>

This shortage of mine detectors encouraged the South Africans to improvise an alternative system. Major Scott of the 13<sup>th</sup> Field Company, South African Engineer Corps, developed a new “wheel barrow” or “pram” mine detector which was an electronics-laden, single-wheeled device that was pushed ahead of a sapper to locate mines.<sup>1</sup> Although the detector was light enough that it would not detonate an antitank mine, trip wires fuze mines, obviously, remained a hazard. After resolving various electrical problems, the South Africans and the 8<sup>th</sup> Army fabricated 29 of these detectors and used them during the Second Battle of El Alamein.<sup>103</sup> The 2/24<sup>th</sup> Field Park Company (Royal Australian Engineers) built 15 similar devices and called them ‘Perambulators.’ The Australian design had the detection head mounted on two bicycle wheels. It was pushed by hand using a 3-meter long boom. The Pram detectors helped compensate for the shortage of the more conventional Polish and Goldak mine detectors.<sup>104</sup>



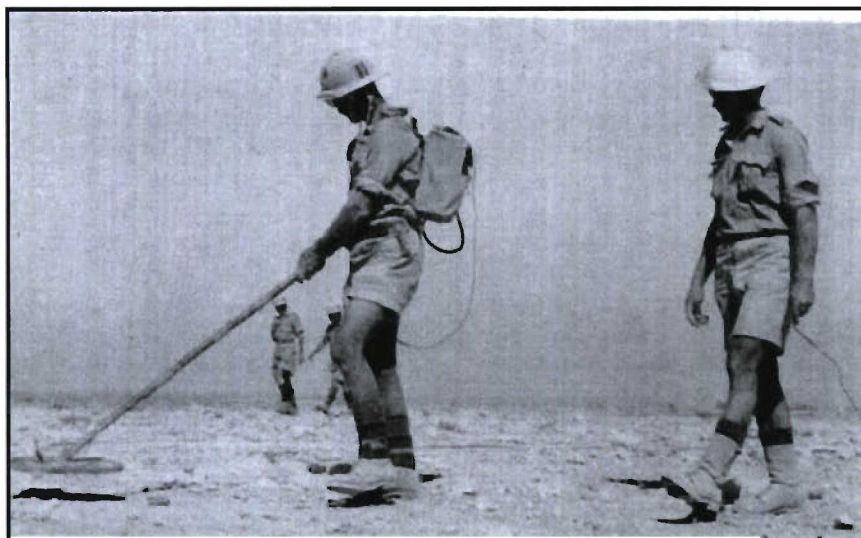
**PHOTO 59. ROYAL INDIAN ENGINEERS USING GOLDAK DETECTORS AND MINE PROBES**



**PHOTO 60. ROYAL ENGINEERS PREPARING TO SWEEP MINES USING THE NEW “POLISH” MINE DETECTOR**

<sup>1</sup> The Allies may have been inspired by the design of the German Frankfurt Model 39 Mine detector. This device had a similar configuration and was issued to German pioneers in North Africa. See North Africa, 1940-1943, Appendixes, Landmine and Countermine Warfare, page O-63.  
Question 3: Is there a photo available of the 8<sup>th</sup> Army’s Pram Mine Detector?





**PHOTO 61. SOUTH AFRICAN ENGINEERS TRAINING TO SWEEP MINES WITH THE NEW “POLISH” MINE DETECTOR**

All of these early mine detectors were fragile instruments, requiring frequent and skillful adjustment to remain functional. However, breakdowns and damage meant that more often than not, the sappers would still have to rely on prodding with a bayonet as their primary means of locating mines while breaching a lane through a minefield. There were also some doubts about the detector's effectiveness in wet weather.<sup>105</sup> In addition, the Italians were already producing a countermeasure, a wooden box mine that could be assembled with a minimum of metal. Although these would prove to be very difficult to detect in future battles, there were very few available to the Axis engineers at El Alamein. Furthermore, all of these early “mine” detectors were, in fact, metal detectors. In addition to metallic mines, they also located innumerable scraps of battlefield debris such as shell fragments, food tins, and the like. Any of these could cause the detector to “sound-off” and had to be investigated and identified as if it were a mine. This caused the loss of much valuable time. Another shortcoming, considering that these detectors could not be effectively operated from the prone, was that with the earphones on and well fitted, the normal noises of the battlefield were to a large extent shut out from the operator. Often, he was left standing as everyone else dove for cover. Needless to say, operating a mine detector was a severe test of the sapper's nerve and required great courage.<sup>106</sup>

#### **5.4.3.5. MECHANICAL BREACHSITE MARKING**

In the XIII Corps zone, the 44<sup>th</sup> Infantry Division supported their minefield task force with at least three “snail” lorries.<sup>i</sup> These were “Pilot Vehicles,” based on the twin-tired ¾ ton trucks of the divisional 211<sup>th</sup> Engineer Field Park Company, but, in addition to their “porcupine” rollers, they were specially fitted with diesel fuel tanks over the rear wheels. These tanks drip-fed diesel fuel onto the tires and, in the process left an unmistakable mark on the desert floor that a truck driver could see, even on a moonless night, hence the name “snail.” These marks were intended to keep the units oriented in the right direction and help them find the breach in the featureless desert by keeping them on the correct route from the line of departure through the safe lanes across the minefields. When driven in echelon, the rollers and tires of several “snails” could cover the entire width of the lane, thus simultaneously marking and proofing the breach. These “snails” were also used to carry the gap-marking stores for the sappers. The Desert Rats of the 7<sup>th</sup> Armoured Division also used the “snail.”<sup>107</sup>

#### **5.4.4. REHEARSALS**

After the development of the sappers' battle drills and ‘improvised’ equipment, the Allies next had to integrate all of the new equipment and ideas into their plans through thorough combined arms rehearsals (Photo 62). Particular attention was paid to passing large bodies of troops through minefield gaps at night. This problem had grown steadily more difficult and important during the North African campaign, and it was now clear that all else

<sup>i</sup> Question 4: Is there a photo available of the ‘Snail’ mine marking system?



would be in vain if it were not satisfactorily solved. The 8<sup>th</sup> Army recognized that it was not going to be easy and they spared no pains. Aerial photographs and intelligence reports showed that the Axis defenses in the area were formidable. There were two distinct defensive zones, each covered by wire and minefields, then a third line of defended localities, and behind that was believed to be the 15<sup>th</sup> and 21<sup>st</sup> panzer divisions as well as the Italian *Ariete* Division. By judiciously rotating the available troops in the front lines, it proved possible for the 8<sup>th</sup> Army to rehearse key units (the 1<sup>st</sup> and 10<sup>th</sup> armoured divisions of the X Corps and the 2<sup>nd</sup> New Zealand Division) as divisions. The other assault divisions of XXX Corps had to make do with smaller scale rehearsals.<sup>108</sup>



**PHOTO 62. UNIT LEVEL TRAINING IN BREACHING OPERATIONS**

As a first step in his preparations, General Freyberg had the Engineer Headquarters staff, of the 2<sup>nd</sup> New Zealand Division; construct a large and detailed relief plaster terrain model of the proposed battlefield, with the vertical elevation exaggerated by a factor of twenty. It was used for sand table rehearsals with his subordinate commanders. Even the most junior officers were given the opportunity to study the model. However, the vertical exaggeration did cause some problems as it gave a false sense of the terrain's appearance.<sup>109</sup>

To help prepare the division for its attack, the New Zealand sappers spent the better part of their first week at the training area emplacing minefields (live and dummy), gun emplacements and infantry positions across hundreds of acres of desert. However, only General Freyberg's senior officers knew that this practice battlefield was a replica of the known Axis defenses on Miteiriya Ridge, their final objective. Next, the sappers practiced day and night until each man was thoroughly familiar with every team members' responsibilities. Finally, the sappers were ready to undertake combined arms training with the infantry and armor. The engineers, using live Bangalore torpedoes on their previously erected wire obstacles, cleared passages for the infantry. Then the sappers cleared and marked lanes through the live minefields beyond for the passage of the supporting arms and services. Finally they laid protective minefields to protect the infantry as they dug in on their objectives. The participants digested the lessons of the mock battles, worked out solutions to any new problems, and tried it again.<sup>110</sup>

#### **5.4.5. OTHER ENGINEER TASKS**

Perhaps the most diverse jobs in the 8<sup>th</sup> Army fell to the engineers. In addition to their essential mine breaching tasks, they had other critical combat engineering functions, to include: the emplacement of mines to protect infantry on recently captured ground, demolitions work (typically the destruction of abandoned Axis equipment), the construction of fortifications, and the destruction/neutralization of unexploded ordnance. They also had to perform logistic engineering tasks such as the construction/maintenance of roads and trails, drilling for water and supporting the deception operations. Unlike the current US organization, the Royal Engineers were responsible for dangerous task of handling unexploded ordnance.<sup>111</sup> Another key task for the XXX Corps engineers was the construction of the tracks leading up to the XXX Corps line of departure (a tremendous task as they had to be built through very soft sand). On 21 September, Brigadier Kisch with Generals de Guingand (B.G.S. for 8<sup>th</sup> Army), General Brian Robertson (D.A. & Q.M.G.), the B.G.S. of X Corps, and Colonel Shannon (D.C.E. Roads) reconnoitered six of these routes.<sup>112</sup> These routes were lit at night with 20 markers per mile.<sup>113</sup> In addition, the Australian engineers had to build four additional tracks for their own use. To make matters more difficult, the tracks had to be completed without drawing unwanted attention from Axis intelligence services.<sup>114</sup>

The engineers also had to construct pre-dug positions for tactical headquarters and medical services that could be occupied at the appropriate time. In the New Zealand sector, much of this work was done by the bulldozers of the 5<sup>th</sup> Field Park Company.<sup>115</sup> Major Reid described the survivability work of his New Zealand engineers, *"Much of the area occupied by 6<sup>th</sup> (New Zealand) Brigade was hard rock, and ordinary digging methods were out of the question. One of the Company's officers was employed full time in operating air compressors and rock drills around the area. These machines worked up to twenty-four hours a day, seven days a week, in assisting the infantry and artillery to dig trenches and gun emplacements. It was necessary to drill holes in the rock and blow it out with explosives. The operators were always assisted by working parties from the infantry and artillery to excavate the debris from the holes. During the night the machines worked in front of the lines, withdrawing to work out of sight from the enemy at daybreak. Each compressor worked two or three shifts and tied up a large number of men. On numerous occasions they have worked under shellfire all day, the operators often being the only men above ground. When possible the compressor itself was kept in a hollow or behind a ridge, long lengths of hose being used to connect it with the work. Competition for the use of these machines was so keen, that in the end they had to be allocated by Brigade H.Q."*<sup>116</sup>

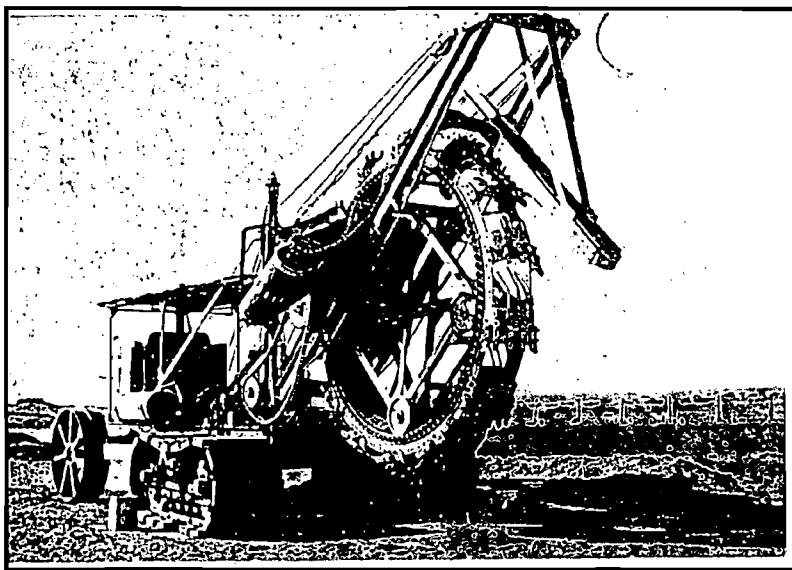
To extend the coverage of the short-ranged Hurricane fighters, the engineers were tasked with the construction of two additional airfields near El Hamman, 65 kilometers west of the main fighter base around Amiriya. The engineers, of the 578<sup>th</sup> Army Troops Company (Royal Engineers), were also responsible for building kilometers of dummy pipeline for fuel and water. The engineers were greatly aided in these tasks through the adoption of mechanical construction equipment such as bulldozers and trenchers that the Axis forces lacked (photos 63 to 66).<sup>i</sup> They were also aided in the accomplishment of their logistic engineering tasks by 25 pioneer and labor companies (as well as 24 more in G.H.Q. reserve).<sup>ii</sup> In addition, the engineers were responsible for the 8<sup>th</sup> Army's workshops that fabricated the Scorpions and the decoys.

<sup>i</sup> Although American Benjamin Holt had built the first successful tracked steam tractor by November 1904, the first successful modern bulldozer was not built until 1921. This invention was created by American Ralph Choate for commercial use. Indeed, most of the world's advances in engineer construction equipment occurred in the US private sector. The first modern, self-propelled road grader (the Auto Patrol) was introduced by Caterpillar in 1931. The first modern scraper was invented by Robert Gilmour Le Tourneau in 1915. The first modern scoop loader appeared in the 1940s. See Caterpillar Dozers & Tractors, by Randy Leffingwell, Lowe & B. Hould Publishers, Michigan, 1997, especially see pages 35, 119, 124, 158, 160. Also see R. G. Le Tourneau: Mover of Men and Mountains. However, the earliest trencher seems to be a German machine. See The German A7V Tank and the Captured British Mark IV Tanks of World War I, pages 38-39. Nonetheless, American observers still felt that the 8<sup>th</sup> Army was equipment poor. See "Engineer Notes on the British Eighth Army," Military Reports on the United Nations, No. 10, Military Intelligence Service, War Department, Washington, D. C., 15 September 1943, page 26. For the origins of early horse drawn predecessors, see "Making Tracks," parts 1-3, by Steven R. Gatke, Timber Times, Issues 17-19.

<sup>ii</sup> Question 5: Who (the 8<sup>th</sup> Army or Middle East Forces) controlled the 24 labor and pioneer companies in 'General Headquarters Reserve'?

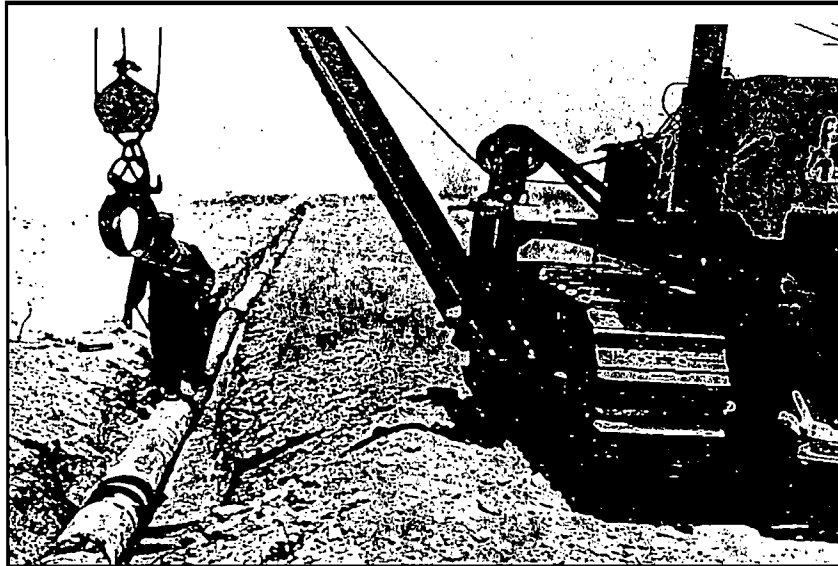


**PHOTO 63. SOUTH AFRICAN ENGINEER USING A US BUILT D7 BULLDOZER TO FILL A ROAD CRATER AS A COUNTERMEASURE TO MINES LAID IN THEM BY THE AXIS.**



**PHOTO 64. "BUCKEYE" DITCHER**





**PHOTO 65. "SIDE-BOOM CRANE" TRACTOR USED BY THE 18<sup>th</sup> ARMY TROOPS COMPANY TO LAY PIPELINE**



**PHOTO 66. NEW ZEALAND ENGINEER USING A JACK HAMMER WHILE CONSTRUCTING A NEW GUN POSITION**

#### **5.4.6. SPECIAL ENGINEER DIRECTIVE FOR OPERATION LIGHTFOOT**

The first paragraph to Brigadier Kisch's Special Engineer Directive was headed "Minefield Clearance." It warned the sappers against over-reliance on fragile electronic mine detectors. The sappers were to be prepared to use "*cruder methods of locating mines*" if necessary. With an eye toward future operations, he directed that, "*After*

*their initial use, all detectors, minefield lamps, etc., must be carefully collected and prepared for use further forward.” Next, he addressed “Tank-busting,” “We are to have free hands and every facility for destroying enemy tanks and guns whenever we can get at them. Units will be prepared to seize every opportunity that presents itself.” Finally, in the last paragraph, he wrote, “Unlike the German Army, the British Army has no special Assault Engineer Units. The reason for this is that every Sapper is an Assault Engineer. This is our privilege and our pride. The Eighth Army is confronted at the moment by fairly strong defensive positions of considerable length and some depth. It falls to the Sappers to open the way for the Army to advance, and whenever gaps have to be cleared, there must be no failure. An immense amount depends upon the resolution and skill with which this task is tackled. The Army Commander is confident that his Sappers will do all that is required of them in this first step to the coming victory.”<sup>i</sup>*

## 5.5. AIR DEFENSE

The Allies were well equipped with antiaircraft artillery. For example, the batteries of the 14<sup>th</sup> Anti-Aircraft Artillery Regiment, stationed in the 2<sup>nd</sup> New Zealand Division zone, occupied areas close to the field artillery regiments, ready to defend them. They were also to displace forward and cover the minefield gaps as they were completed. Considering that the Desert Air Force had achieved air superiority over the Axis, it was decided to task some of the 40mm Bofors guns to periodically fire tracer rounds across the featureless desert to mark unit boundaries. This was intended to help the soldiers maintain their orientation in the dark.<sup>117</sup>

## 5.6. LOGISTICS

By late October, General Montgomery had amassed a significant numerical superiority over the *panzerarmee* in all critical categories. At Churchill’s urgent request for assistance, following the 8<sup>th</sup> Army’s stunning defeat at Gazala, President Roosevelt had stripped the American 1<sup>st</sup> Armored Division of 318 of its new Shermans as well as other equipment and shipped them to Egypt by 11 September.<sup>118</sup> By the time of the attack, the Allies had 1,029 tanks (including 252 M4 Shermans and 170 M3 Grants), 908 field and medium artillery pieces with plenty of ammunition and 1,403 antitank guns (including 849 6-pounders, see Appendix J, Allied Order of Battle). To support this equipment, more than 300,000 rounds of artillery (including 268,000 rounds of 25-pounder and 20,000 rounds of 4.5-inch and 5.5-inch) were concealed close to the firing batteries.<sup>119</sup> As an example, the 9<sup>th</sup> Australian Division had 600 rounds per gun and 7,500 tons of fuel dumped forward, with 18,000 tons in reserve.<sup>120</sup> Indeed, an average of 2,500 tons of supply arrived at the front every day.<sup>121</sup> From 1 August to 23 October, the 8<sup>th</sup> Army received 41,000 men, over 1,000 tanks, 360 Universal (Bren Gun) Carriers, and 8,700 vehicles.<sup>122</sup>

Also of interest, to the armored divisions, were the considerable advances that had been made in the system of recovery and repair of tanks, and their delivery to units. The recovery of disabled tanks from the battlefield back as far as the 3<sup>rd</sup> echelon workshops and all field repair was the responsibility of X Corps. To execute this mission, they had 148 tank transporters, 61 heavy tractors and 76 breakdown tractors.<sup>ii</sup> Some time previously, the British Army had reorganized this area and created the Corps of Royal Electrical and Mechanical Engineers and as well as a new Head of Service in the form of the Chief Royal of Electrical and Mechanical Engineers (the C.R.E.M.E.) to the divisional staffs. He worked in close cooperation with the D.D.M.E.<sup>iii</sup> of the corps. It was now possible for the division to put into action a greater number of battle-worthy tanks than ever before. The control of the C.R.E.M.E. extended to the brigade and unit level workshops, so it was possible to coordinate the efforts of all these technical specialists and thus avoid much waste of time and labor. The creation of Tank Delivery Squadrons in the corps and divisions meant that there was a quicker flow forward of new and repaired tanks and other vehicles, and that they arrived at their units in a better state than had often been the case in the past.<sup>123</sup>

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<sup>i</sup> Brigadier Frederick Kisch, *Soldier and Zionist*, pages 170-171. However, it should be noted that the Germans did not employ specialized assault engineers in any significant numbers in WWII (unlike WWI). Early in the Second World War, assault engineer tasks also fell to the rank and file *pioneer*, just like his British counterpart. However, later in the war, the British Army found it desirable to establish several specialized units called “Assault Regiment, Royal Engineers.”

<sup>ii</sup> For a detailed account, see “Tank Recovery and Maintenance in the Western Desert,” Military Reports on the United Nations, Military Intelligence Service, War Department, Washington, D. C., pages 38-39.

<sup>iii</sup> Question 6: What does D.D.M.E. stand for?

## 5.7. COMMAND AND CONTROL

Effective command and control of combined arms deliberate breaching operations at night would be extremely difficult, but essential to success. After the First Battle of El Alamein, Churchill felt compelled to replace General Auchinleck as commander of the 8<sup>th</sup> Army. His initial choice was General Gott, Commander of XIII Corps. However, General Gott was killed soon thereafter when an Axis fighter attacked the aircraft he was riding in. As a result, General Bernard Montgomery was ordered to Egypt from England and assumed command of the 8<sup>th</sup> Army on 13 August.<sup>124</sup>

The army, which he was assuming command of, had not performed up to expectations. In particular, the record of combined arms operations by the Eighth Army was not encouraging. So far, it had lost most of its battles against the Desert Fox, even though its strength had been greater than that of its opponents. The soldiers credited even the recent victory at Alam Halfa in early September more to the naval and air units on Malta than to the leadership of the army.<sup>125</sup> The most obvious defect was the lack of cooperation and understanding between the infantry and the armor, a problem that was aggravated by significant regimental parochialism.<sup>1</sup> Previous infantry night attacks by the 8<sup>th</sup> Army had usually consisted of one or two separate attacks on a two-brigade or less (often much less) basis to seize an objective. This objective then had to be held with open flanks and meager antitank artillery against the inevitable counterattacks by the German panzers, without armor support. Frequently in these previous attacks, narrow breaches had been made in minefields, only to be closed by Axis counteraction or sometimes blocked by a single vehicle's immobilization. It was only natural that some of the infantry felt some suspicion. They had been let down by British armor before. Some individuals had developed a real hatred of British armor.<sup>126</sup> They directed their criticism against the British generals, and they were inclined to think that the burden of war had been allowed to rest, with undue weight, upon Dominion troops. However, this time General Montgomery's new plan, Operation Lightfoot, required the army's "elite" armored corps to be out in front at dawn this time.<sup>127</sup> In support of this plan, General Montgomery attempted to solve the problems of hostility and distrust, between the infantry and armor, through extensive combined arms rehearsals at lower levels.<sup>128</sup>

As part of his attempt to remedy the 8<sup>th</sup> Army's past problems in conducting combined arms operations, General Montgomery directed that "*tanks that are to work in close cooperation with infantry must actually train with that infantry from now onwards.*" The preparations and training were to be extremely thorough.

However, there remained considerable friction at the senior command level, as General Montgomery's Chief of Staff, Brigadier Freddy Guinand,<sup>ii</sup> reported, "*Montgomery's change in plan as regards the use of our armor nearly caused a crisis between himself and General Herbert Lumsden, who had been selected to command the "Corps d'Elite"-X Corps. Lumsden had fought with conspicuous gallantry when commanding a division in the "bad old days." He was a cavalryman through and through and not unnaturally thought in terms of the mobile battle and yearned for the day when his armored formations, equipped with modern tanks, would be launched through a gap made by the infantry to roam far and wide. The Army Commander's new instructions were not to his liking.*

*Shortly after this, Lumsden held a corps conference at which he explained his plan and views to all commanders in his corps. Montgomery was temporarily absent from the army on this occasion and I therefore decided to attend the conference myself.*

*It soon became clear to me that this new conception of the use of armor had not been fully accepted by the corps commander, and at the end of the meeting I had a talk with Lumsden pointing out the Army Commander's determination to fight the coming battle this way. But I could see that he was anything but happy and there appeared to be a recrudescence of the bad old habit of questioning orders.*

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<sup>i</sup> For an in depth study of this fascinating topic see "The Process of Change: The British Armored Division; Its Development and Employment in North Africa during World War II," by Major Daniel A. Hahn, DTIC # AD-A163067, US Army Command and General Staff College, Fort Leavenworth, Kansas, 1985, Chapter 5. For an example, see 24 Battalion, by R. M. Burdon, War History Branch, Official History of New Zealand in the Second World War 1939-45, Department of Internal Affairs, Wellington, New Zealand, 1953, page 120.

<sup>ii</sup> Other positions of great responsibility at 8<sup>th</sup> Army Headquarters were the CRA (Chief of Royal Artillery, Brigadier S. C. Kirkman), the CRE (Chief of Royal Engineers, Brigadier Frederick H. (Cecil) Kisch), and the Head of Administration (Brigadier Sir Brian Robertson).



*On the Army Commander's return, I reported fully on what had taken place and he lost little time making his views crystal clear to the commander of X Corps; and Lumsden, being a good soldier, accepted the position and made the necessary changes in his plans."*<sup>129</sup>

Tactical communications were another problem. Major Moore of the 10<sup>th</sup> Armoured Division, for example, felt this was the engineers' greatest difficulty. *"Radio was on wavelengths between 60 and 120 metres. The sets used a lot of power, and were often almost completely blacked out by static at night. We had the 18 set as a Manpack set, and the Sappers had only two or three per squadron. They were exceedingly heavy, of limited range and exceedingly unreliable. With so many tracked vehicles moving freely in all directions, telephone lines were very soon torn up. We had a 19 set at squadron headquarters but Sappers were nothing like so radio conscious in those days, and in its soft skinned vehicle the 19 set was too vulnerable to take far forward."*<sup>130</sup>

## CHAPTER ENDNOTES

<sup>1</sup> The Rommel Papers, page 284.

<sup>2</sup> The Memoirs of Field-Marshal the Viscount Montgomery of Alamein, by Bernard Montgomery, World Publishing Company, New York, 1958, page 107.

<sup>3</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 10

<sup>4</sup> Orders of Battle, Volume II, United Kingdom and Colonial Formations and Units in the Second World War, 1939-1945, by H. F. Joslen, Her Majesty's Stationery Office, London, 1960, page 575. See also Alam Halfa and Alamein, pages 249-250.

<sup>5</sup> Panzer Commander, The Memoirs of Colonel Hans Von Luck, by Hans von Luck, Praeger publishers, New York, 1989, pages 86-92.

<sup>6</sup> Monty, The Making of a General, 1887-1942, by Nigel Hamilton, McGraw-Hill Book Company, New York, 1981, page 744.

<sup>7</sup> The Memoirs of Field-Marshal the Viscount Montgomery of Alamein, page 107.

<sup>8</sup> Monty, The Making of a General, 1887-1942, page 744.

<sup>9</sup> Tobruk and El Alamein, page 640. See also Monty, The Making of a General, 1887-1942, page 744-747.

<sup>10</sup> The Memoirs of Field-Marshal the Viscount Montgomery of Alamein, page 108.

<sup>11</sup> Foxes of The Desert, The Story of the Afrika Korps, page 284.

<sup>12</sup> The Memoirs of Field-Marshal the Viscount Montgomery of Alamein, page 108. See also The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 4, and Alam Halfa and Alamein, pages 228-230.

<sup>13</sup> The Memoirs of Field-Marshal the Viscount Montgomery of Alamein, page 110.

<sup>14</sup> Alam Halfa and Alamein, page 214.

<sup>15</sup> The War Magician, by David Fisher, Coward-McCann Incorporated, New York, 1983, pages 283 and 289.

<sup>16</sup> A Full Life, by Sir Brian Horrocks, Collins, At James Place, London, 1960, page 131.

<sup>17</sup> Alam Halfa and Alamein, page 248.

<sup>18</sup> The Ultra Secret, page 111-123.

<sup>19</sup> "Engineers at the Battle of Alamein – the Southern Sector," pages 20-25.

<sup>20</sup> The War Magician, pages 271 and 286. See also The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 17.

<sup>21</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 18.

<sup>22</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, pages 18-19.

<sup>23</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 3.

<sup>24</sup> Outraged Skies, by Edward Jablonski, contained in Airwar, Doubleday & Company, Garden City, New York, 1971, pages 8-11. See also Log of the Liberators, An Illustrated History of the B-24, by Steve Birdsall, Doubleday & Company, Garden City, New York, 1973, pages 5-9.

<sup>25</sup> Kesselring, A Soldier's Record, page 157-158.

<sup>26</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, pages 19-20; and Alam Halfa and Alamein, page 254.

<sup>27</sup> Orders of Battle, Volume II, United Kingdom and Colonial Formations and Units in the Second World War, 1939-1945, page 575-576.

<sup>28</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 35-36.

<sup>29</sup> 2<sup>nd</sup> New Zealand Divisional Artillery, page 378. See also Alam Halfa and Alamein, page 254.

<sup>30</sup> 2<sup>nd</sup> New Zealand Divisional Artillery, page 378. See also Alam Halfa and Alamein, page 254.

<sup>31</sup> Brigadier Frederick Kisch, Soldier and Zionist, by Norman Bentwich and Michael Kisch, Vallentine, Mitchell & Co., London, 1966, page 148.

<sup>32</sup> Tobruk and El Alamein, pages 575-576.

<sup>33</sup> The Turning Point, With the N. Z. Engineers at El Alamein, pages 107-141.

<sup>34</sup> Brigadier Frederick Kisch, Soldier and Zionist, page 148.

<sup>35</sup> The Rommel Papers, pages 276-281.

<sup>36</sup> New Zealand Engineers, Middle East, page 341.

- <sup>37</sup> New Zealand Engineers, Middle East, page 341 and Alamein, page 90.
- <sup>38</sup> "Engineers at the Battle of Alamein – the Southern Sector," pages 20-29.
- <sup>39</sup> "Alamein: The Tide Turns," by Major-General Sir Francis de Guingand, History of the Second World War, Part 46, Marshal Cavendish USA Ltd., 1973, page 1076.
- <sup>40</sup> The Rommel Papers, page 260.
- <sup>41</sup> Brigadier Frederick Kisch, Soldier and Zionist, pages 155-157.
- <sup>42</sup> "Mine Clearance-El Alamein," by P. N. M. Moore, The Royal Engineers Journal, Vol. 106 No. 3, December 1992, page 193.
- <sup>43</sup> "Mine Clearance-El Alamein," page 193.
- <sup>44</sup> "The Assault At Alamein," by Brigadier G. R. McMeekan, Royal Engineers Journal, Volume LXIII, 1949, pages 319-320 and "Minefield Clearance-El Alamein," pages 194 and 197.
- <sup>45</sup> "Mine Clearance-El Alamein," page 194.
- <sup>46</sup> Alamein, page 95.
- <sup>47</sup> "Minefield Clearance Methods of the Eighth Army," Military Reports on the United Nations, No. 2, Military Intelligence Service, War Department, Washington, D. C., 15 January 1943, page 30.
- <sup>48</sup> New Zealand Engineers, Middle East, page 343.
- <sup>49</sup> El Alamein, by Michael Carver, The MacMillan Company, New York, 1962, page 89.
- <sup>50</sup> "Notes on Eighth Army Minefield Clearance," Military Reports on the United Nations, No. 5, Military Intelligence Service, War Department, Washington, D. C., 15 April 1943, page 25. For German doctrine extant at this time, see: "Richtlinien fuer das ueberwinden feindlicher Minensperren im Angriff," in US National Archives, Captured German Records Division, Record Group 242/1027, Series T-78, Roll No. 643, 1<sup>st</sup> frame 1. "Vorlaeufige Ausbildungsanleitung fuer das Ueberwinden von Minenfeldern unter Verwendung der electrischen M.S.-Geraet," 10 July 1941, in US National Archives, Captured German Records Division, Series T-78, Roll No. 843, H36/94. "Merkblatt ueber Bekampfungsmoeglichkeit von Panzersperren und Ueberwinden von Panzerhindernissen," Berlin, 1940, in US National Archives, Captured German Records Division, Record Group 242/1027, Series T-78, Roll No. 843, H 36/91. And "Richtlinien fuer das ueberwinden feindlicher Minensperren im Angriff," dated 23 January 1940, US National Archives, Captured German Records Division, Record Group 242/1027, Series T-78, Roll No. 643, 1<sup>st</sup> frame 1.
- <sup>51</sup> Tobruk and El Alamein, pages 651.
- <sup>52</sup> New Zealand Engineers, Middle East, page 344. See Also "The New Zealand Division in Egypt and Libya, Operations "Lightfoot" and "Supercharge," by General Bernard Freyberg, Headquarters, New Zealand Division, 20 November 1942, Appendix A. "Mine Clearance-El Alamein," page 194, "Minefield Clearance Methods of the Eighth Army," pages 30-36, Brigadier Frederick Kisch, Soldier and Zionist, page 155-159, and War in the Desert, The Eighth Army at El Alamein, by James Lucas, Beaufort Books Inc., New York, 1982, pages 112-120.
- <sup>53</sup> Tobruk and El Alamein, page 651.
- <sup>54</sup> Tobruk and El Alamein, page 651.
- <sup>55</sup> Tobruk and El Alamein, page 651.
- <sup>56</sup> Brigadier Frederick Kisch, Soldier and Zionist, page 160.
- <sup>57</sup> The Turning Point, With the N. Z. Engineers at El Alamein, page 105.
- <sup>58</sup> Tobruk and El Alamein, page 651. see also New Zealand Engineers, Middle East, page 343.
- <sup>59</sup> Alamein, page 97, and The Crucible of War, Year of Alamein, 1942, by Barrie Pitt, Jonathan Cape Ltd., London, 1982, page 268.
- <sup>60</sup> German Mine Warfare Equipment, TM 5-223C, Department of the Army, March 1952, pages 78-79.
- <sup>61</sup> The Turning Point, With the N. Z. Engineers at El Alamein, page 106.
- <sup>62</sup> "The Assault At Alamein," page 320.
- <sup>63</sup> North Africa, 1940-1943, Appendixes, Landmine and Countermine Warfare, page N-1 to N-3.
- <sup>64</sup> North Africa, 1940-1943, Appendixes, Landmine and Countermine Warfare, page N-1 to N-3.
- <sup>65</sup> Alam Halfa and Alamein, page 224 and The Crucible of War, Year of Alamein, 1942, page 268.
- <sup>66</sup> New Zealand Engineers, Middle East, page 344, "Mine Clearance-El Alamein," page 194, and "Minefield Clearance Methods of the Eighth Army," page 35.
- <sup>67</sup> New Zealand Engineers, Middle East, page 344.
- <sup>68</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 39.
- <sup>69</sup> New Zealand Engineers, Middle East, page 344.
- <sup>70</sup> "Notes on Eighth Army Minefield Clearance," page 23.
- <sup>71</sup> Unless otherwise noted, information on the development of the flail tank is based on Salute the Sappers, Part I. The Formation of the South African Engineer Corps and its Operations in East Africa and the Middle East to the Battle of Alamein, by Neil Orpen with H. J. Martin, Sappers Association, Johannesburg, 1981, pages 397-398 and 413-414, The Great Tank Scandal, British Armour in the Second World War, Part 1, by David Fletcher, Her Majesty's Stationery Office, London, 1989, page 122, Brigadier Frederick Kisch, Soldier and Zionist, pages 159-163, and Taming the Landmine, by Peter Stiff, Galago Publishing Ltd., Alberton, Republic of South Africa, 1986, pages 23-24.
- <sup>72</sup> Matilda, Infantry Tank, 1938-1945, by David Fletcher, Osprey Publishing Ltd., London, 1994.
- <sup>73</sup> Alam Halfa and Alamein, page 224.
- <sup>74</sup> "Historical Excerpts of Mine Warfare Research and Development, 1942-1959," by H. C. Smith, Report 1924 (DTIC # AD830470), US Army Mobility Equipment Research and Development Center, Ft Belvoir Virginia, March 1968, page 66.
- <sup>75</sup> Alam Halfa and Alamein, page 252.



- <sup>76</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 38.
- <sup>77</sup> El Alamein, page 89.
- <sup>78</sup> "The Assault At Alamein," page 324.
- <sup>79</sup> El Alamein, page 89.
- <sup>80</sup> War in the Desert, South African Forces, World War II, Volume III, by Neil Orpen, Purnell, Johannesburg, 1971, page 409.
- <sup>81</sup> "Engineers at the Battle of Alamein – the Southern Sector," page 27.
- <sup>82</sup> Royal Engineers, by Derek Boyd, Leo Cooper Ltd., London, 1975, pages 75-76.
- <sup>83</sup> "The Char B Mine Roller," by Gary Simpson, AFV G-2 Magazine, pages 26-27.
- <sup>84</sup> Tobruk and El Alamein, page 651. See also Encyclopedia of Tanks, by Duncan Crow and Robert Icks, Chartwell Books, page 27, Pictorial History, Tanks of the World, 1915-45, by Peter Chamberlain and Chris Ellis, page 96, and "British Minefield Clearance Devices," Military Reports on the United Nations, No. 3, Military Intelligence Service, War Department, Washington, D. C., 15 February 1943, page 17.
- <sup>85</sup> The Turning Point, With the N. Z. Engineers at El Alamein, pages 176-177.
- <sup>86</sup> The Royal Australian Engineers, 1919 to 1945, Teeth and Tail, by Ronald McNicoll, The Corps Committee of the Royal Australian Engineers, Canberra, 1982, page 112.
- <sup>87</sup> Salute the Sappers, Part I. The Formation of the South African Engineer Corps and its Operations in East Africa and the Middle East to the Battle of Alamein, page 414.
- <sup>88</sup> Salute the Sappers, Part I. The Formation of the South African Engineer Corps and its Operations in East Africa and the Middle East to the Battle of Alamein, pages 427, 428, and 432.
- <sup>89</sup> "Mine Clearance-El Alamein," page 194.
- <sup>90</sup> "The New Zealand Division in Egypt and Libya, Operations 'Lightfoot' and 'Supercharge,'" page 16.
- <sup>91</sup> "The Destruction of Wire Entanglements. A Suggested Method," by R. L. McClintock, Royal Engineers Journal, March 1913, pages 129-137.
- <sup>92</sup> "Employment of CW Mortar Troops at El Alamein," Military Reports on the United Nations, Military Intelligence Service, War Department, Washington, D. C., 1943, page 30.
- <sup>93</sup> "Richtlinien fuer das ueberwinden feindlicher Minensperren im Angriff," pages 41 to 43. See also Handbook on German Military Forces, pages 480 & 481, and German Mine Warfare Equipment, pages 215-216.
- <sup>94</sup> History of the Corps of Royal Canadian Engineers, Volume II, 1936-1946, by A. J. Kerry and W. A. McDill, The Military Engineers Association of Canada, Ottawa, 1966, page 99.
- <sup>95</sup> "British Minefield Clearing Devices," page 18.
- <sup>96</sup> The Great Tank Scandal, British Armour in the Second World War, Part I, page 122.
- <sup>97</sup> New Zealand Engineers, Middle East, pages 341-343 and "Notes on British Eighth Army Minefield Clearance," page 23.
- <sup>98</sup> "Mine and Countermine Warfare in recent History, 1914-1970," by Russel H. Stolfi, Report No. 1582, (DTIC # AD 893920), Ballistic Research Laboratories, Aberdeen Proving Grounds, Maryland, April 1972, page 21.
- <sup>99</sup> New Zealand Engineers, Middle East, page 201.
- <sup>100</sup> Le Operazioni in Africa Settentrionale, Vol. III-El Alamein, page 688.
- <sup>101</sup> "Notes on Eighth Army Minefield Clearance," page 23.
- <sup>102</sup> The Royal Australian Engineers, 1919 to 1945, Teeth and Tail, pages 111-112.
- <sup>103</sup> Salute the Sappers, Part I. The Formation of the South African Engineer Corps and its Operations in East Africa and the Middle East to the Battle of Alamein, page 421, and Taming the Landmine, page 25.
- <sup>104</sup> The Royal Australian Engineers, 1919 to 1945, Teeth and Tail, page 112.
- <sup>105</sup> "Engineer Notes on the British Eighth Army," Military Reports on the United Nations, No. 10, Military Intelligence Service, War Department, Washington, D. C., 15 September 1943, page 30.
- <sup>106</sup> New Zealand Engineers, Middle East, page 343.
- <sup>107</sup> "Engineers at the Battle of Alamein – the Southern Sector," page 26.
- <sup>108</sup> Alam Halfa and Alamein, pages 189-195. Tobruk and El Alamein, pages 654-655. Monty, The Making of a General, 1887-1942, page 712-731.
- <sup>109</sup> New Zealand Engineers, Middle East, page 346-347.
- <sup>110</sup> For the most detailed account, see The Turning Point, With the N. Z. Engineers at El Alamein, pages 166-168. See also New Zealand Engineers, Middle East, page 346.
- <sup>111</sup> The Turning Point, With the N. Z. Engineers at El Alamein, pages 55-65.
- <sup>112</sup> Brigadier Frederick Kisch, Soldier and Zionist, page 165.
- <sup>113</sup> "Notes on British Eighth Army Minefield Clearance," page 24.
- <sup>114</sup> Tobruk and El Alamein, pages 649.
- <sup>115</sup> Alam Halfa and Alamein, page 222.
- <sup>116</sup> The Turning Point, With the N. Z. Engineers at El Alamein, pages 110-111.
- <sup>117</sup> 2<sup>nd</sup> New Zealand Divisional Artillery, pages 381 & 385.
- <sup>118</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 8.
- <sup>119</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 15.



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- <sup>120</sup> Tobruk and El Alamein, page 639.
- <sup>121</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 16.
- <sup>122</sup> Tobruk and El Alamein, page 639.
- <sup>123</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 16.
- <sup>124</sup> Alam Halfa and Alamein, pages 25-27.
- <sup>125</sup> 2<sup>nd</sup> New Zealand Divisional Artillery, page 376.
- <sup>126</sup> El Alamein, Ultra and the Three Battles, by Alexander McKee, Souvenir Press, London, 1991.
- <sup>127</sup> Tobruk and El Alamein, pages 645-646.
- <sup>128</sup> Monty, The Making of a General, 1887-1942, pages 712-741, especially 740.
- <sup>129</sup> "Alamein: The Tide Turns," page 1076.
- <sup>130</sup> "Mine Clearance-El Alamein," page 194.

## 6. BREACHING OPERATIONS, 6<sup>th</sup> NEW ZEALAND BRIGADE ZONE

### 6.1. TACTICAL OVERVIEW

#### 6.1.1. XXX CORPS PLAN

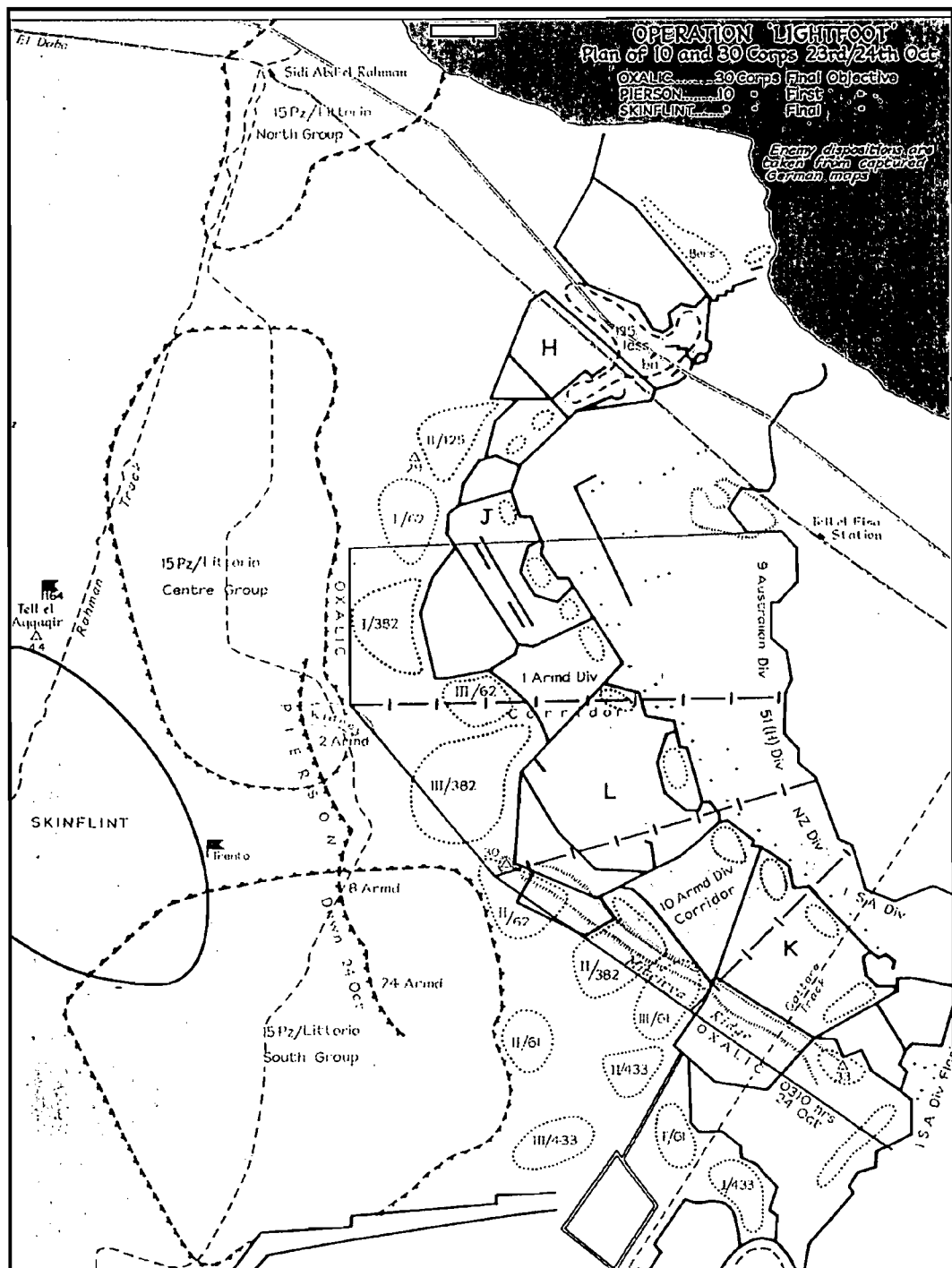
General Montgomery planned for Operation Lightfoot<sup>i</sup> to be executed in three successive phases which he referred to as ‘the break in,’ ‘the dog-fight,’ and ‘the break out.’ For this operation, General Leese’s XXX Corps was tasked with the 8<sup>th</sup> Army’s main effort in the ‘break in’ phase in the form of a two-pronged attack between Tel el Eisa and Miteiriya Ridge (see Appendix B, Operation Lightfoot Operations Order).<sup>1</sup> General Leese planned for the northern or right-handed blow to be struck by the 9<sup>th</sup> Australian and 51<sup>st</sup> Highland divisions, advancing due west below the Tel el Eisa Ridge toward Kidney Ridge. This would create the “Northern Corridor” (consisting of ‘Sun,’ ‘Moon,’ and ‘Star’ tracks), which was located along the boundary between these two divisions. Meanwhile, the 2<sup>nd</sup> New Zealand and 1<sup>st</sup> South African divisions were to drive south-west against the northern flank of the Axis salient running along Miteiriya Ridge, thus creating the “Southern Corridor” (consisting of ‘Bottle,’ ‘Ink,’ ‘Boat,’ and ‘Hat’ tracks) in the center of the New Zealanders’ zone (Map 6). The northern and southern corridors would be separated by a gap of some 3000 meters at Phase Line Oxalic, the XXX Corps objective. This objective was supposed to be seized by 0310 on 24 October. To increase the likelihood of success, General Montgomery weighted his main effort with the most extensive artillery support yet seen in the North African campaign. In the process, the divisions of XXX Corps were expected to fix the defending Axis infantry battalions of the opposing 102<sup>nd</sup> Trento and 164<sup>th</sup> *Leicht Afrika* divisions in place.

At the same time that these two corridors were supposed to be forced open, the 4<sup>th</sup> Indian Division was to stage a diversionary raid against the Italian Bologna Division in the Deir el Shein area, in the middle portion of the Axis defensive front. Further south, General Horrocks’ XIII Corps was to launch a supporting attack against the Italian paratroopers of the 185<sup>th</sup> *Folgore* Division, just north of the Qattara Depression. The first phase of Operation Lightfoot required the 8<sup>th</sup> Army’s sappers to breach about 31 lanes (each typically 14.6 meters (16 yards) wide and, on average, 6,300 meters long) during a single night against an average density of 7,875 mines per kilometer of front. The density of the mines meant that about 4,620 mines would need to be neutralized by the 8<sup>th</sup> Army during Phase One alone, an average of about 150 mines per lane (Table 22).

**TABLE 22. BREACH FORCE ALLOCATIONS AND TASKS  
FOR THE NIGHT OF 23/24 OCTOBER**

Unit	Breach Force (Engineer Allocation)	Number of Vehicle Lanes	Width (in yards)	Length (in yards)
9 <sup>th</sup> Australian Div.	2/7 Field Company	2	8	7,000
	2/13 Field Company (+)	2 (?)	8	7,900
1 <sup>st</sup> Armoured Div.	7 <sup>th</sup> Squadron	1	8 later widen to 16	7,900
	9 <sup>th</sup> Field Squadron	1	8 later widen to 16	7,900
	572 <sup>nd</sup> Army Field Company	1	8 later widen to 16	7,900
51 <sup>st</sup> Highland Div.	274 <sup>th</sup> , 275 <sup>th</sup> , & 276 <sup>th</sup> Field Companies	6	?	6,000 to 7,900
2 <sup>nd</sup> New Zealand Div.	7 <sup>th</sup> Field Company	1	16	6,000
		1	8 (for return traffic)	6,000
	8 <sup>th</sup> Field Company	1	16	5,100
		1	8 (for return traffic)	5,100
10 <sup>th</sup> Armoured Div.	573 <sup>rd</sup> Army Field Company (-)	1	8 later widen to 16	6,000
	3 <sup>rd</sup> Field Squadron (+)	2	8 later widen to 16	5,500
	571 <sup>st</sup> Army Field Company (-)	1	8 later widen to 16	5,100
1 <sup>st</sup> South African Div.	3 <sup>rd</sup> Field Company (+)	3(?)	16(?)	4,000
	2 <sup>nd</sup> Field Company	3(?)	16(?)	4,000
	1 <sup>st</sup> Field Company	1	250	4,000
7 <sup>th</sup> Armoured Division	11 <sup>th</sup> Field Company	1(later 2)	4	15,000
	4 <sup>th</sup> Field Squadron	2 (later 4)	4	15,000

<sup>i</sup> The name ‘Lightfoot’ was apparently chosen, with typical British humor, as a macabre reference to the ubiquitous land mines.



After XXX Corps secured Phase Line Oxalic, they were to conduct a passage of lines with the 1<sup>st</sup> and 10<sup>th</sup> armoured divisions of General Lumsden's X Corps, who would then continue the attack to Phase Line Pierson, which they were supposed to seize by dawn. There, on ground of General Montgomery's choosing, they were to assume a defensive posture. Thus, having seized this key terrain, they were expected to meet and destroy the armor of the *panzerarmee*, which was expected to launch its habitual series of counter attacks to relieve their infantry, which XXX Corps was expected to fix in place. This was the 'dogfight' phase of the battle that General



Montgomery also referred to as a 'crumbling operation'.<sup>1</sup> During the second phase, the 2<sup>nd</sup> New Zealand Division was supposed to revert to the command of X Corps as part of the exploitation force. The final phase (the break out) was to begin after the Axis counterattacks had been exhausted with X Corps resuming their westward attack to Objective Skinflint to cut the Axis supply line along the Rahman Track at Tel el Aqqaqir and to destroy the remnants of the *panzerarmee*. As part of his final speech to his senior officers on 19 and 20 October, General Montgomery warned, "*Organize ahead for a "dogfight" of a week. Whole affair about 12 days.*"<sup>3</sup>

#### 6.1.2. 2<sup>nd</sup> NEW ZEALAND DIVISION PLAN

General Bernard Freyberg, the commanding general of the 2<sup>nd</sup> New Zealand Division, believed that the tactical nature of the desert campaign waged thus far in North Africa had changed due to the fixed defenses at El Alamein. Although the German's highly mobile panzer divisions had tactically dominated the desert battlefields to date, General Freyberg observed that, "*The northern sector of the El Alamein front was the nearest approach to the static defences of the last war yet seen in North Africa, and it was the technique of 1918 which was used as the basis of the plan for our attack.*" General Freyberg felt that because of the *Wehrmacht's* reliance on mobile warfare tactics, the German infantry was no longer suited for this type of attritional warfare and that their infantry could no longer conduct independent offensive operations. Indeed, he believed that, "*they had become tank followers. They have lost their old skill in handling their personal weapons.*"<sup>4</sup>

For Operation Lightfoot, the 2<sup>nd</sup> New Zealand Division (having only two infantry brigades) was to be reinforced by Brigadier John Currie's 9<sup>th</sup> Armoured Brigade, and additional artillery regiments, both field and medium. For the 'break in' phase, General Freyberg planned to attack with his two infantry brigades abreast, the 5<sup>th</sup> (under Brigadier Kippenberger) on the right and 6<sup>th</sup> (under Brigadier Gentry) on the left, with the armored brigade trailing. The attack was to begin from a line immediately west of the Qattara Track and drive southwest to Miteiriya Ridge with heavy artillery support from guns controlled by Brigadier Weir, the division's Chief of Royal Artillery. Each brigade planned to take its first (intermediate) objective along Phase Line Red with a single infantry battalion. Two companies of Maoris (descendants of the original inhabitants of New Zealand) from the 28<sup>th</sup> Infantry Battalion were to follow each of the lead infantry battalions and were responsible for mopping up any bypassed outposts. Behind the two companies of Maoris, came a reinforced sapper company who were to breach two lanes through the minefields in each brigade sector for the vehicles of the follow-on forces. After the first objective was taken, the two trailing infantry battalions of each brigade would conduct a passage of lines and resume the attack to the division's final objectives along Phase Line Oxalic (Miteiriya Ridge), which was equally divided between the two brigades. Aside from the ridge and a few folds in the ground, the terrain in this area was fairly level, affording little cover or concealment. In addition, the ground was hard and rocky, which would make it difficult for the infantry to dig-in after their final objectives were taken (See Appendix H, Terrain Analysis).<sup>5</sup> Close behind Brigadier Gentry's 6<sup>th</sup> Brigade was the 2<sup>nd</sup> New Zealand Divisional Cavalry Regiment, which was under the control of the 9<sup>th</sup> Armoured Brigade for this attack. The cavalry was followed by elements of the British 9<sup>th</sup> Armoured Brigade, under Brigadier John Currie. These tanks were intended to provide close support to the infantry, if needed. Brigadier Currie's 9<sup>th</sup> Armoured Brigade was '*to be used as necessary in order to ensure the capture of the bridgehead at all costs.*' Other than a troop of Crusaders attached to each of the four leading infantry battalions in the attack to the final objective, the tanks were not to be used in units smaller than a squadron nor were they to be sent into unbreached minefields. In addition, '*a proportion should be kept available to meet counter-attacks at dawn.*'<sup>6</sup>

The 10<sup>th</sup> Armoured Division, following the 9<sup>th</sup> Armoured Brigade, was responsible for breaching its own lanes through the Axis minefields. These lanes were located in the center of the 2<sup>nd</sup> New Zealand Division's zone on a frontage of 1,000 yards (900 meters). At Phase Line Oxalic, the 9<sup>th</sup> Armoured Brigade was supposed to revert to the 10<sup>th</sup> Armoured Division. Then, the 10<sup>th</sup> Armoured Division was to conduct a passage of lines and continue the attack to Phase Line Pierson.<sup>7</sup> However, General Freyberg felt that, "*the supporting arms for the infantry, including our own tank brigade, were a first priority, even if it meant delaying 10<sup>th</sup> Corps.*" Also, General Freyberg wrote, "*We had also to be prepared for an immediate counter-attack by enemy armour, for extremely heavy artillery fire at dawn on the exposed ridge itself, and for further enemy defences and minefields beyond our objective. Again, we felt that if we effected surprise and penetrated his held positions, we had to be ready to exploit success, and to endeavor completely to breach the enemy defences... The vital factor was to prevent the infantry on the objective from being over-run by tanks.*"<sup>8</sup>

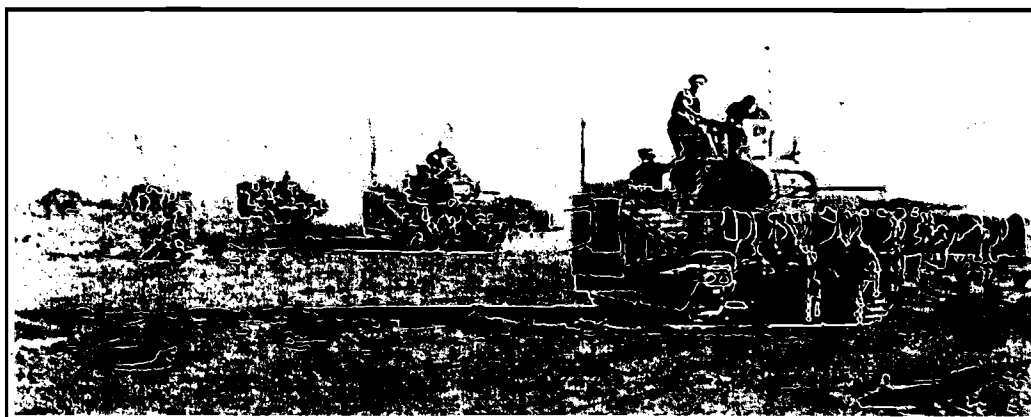
<sup>1</sup> Question 7: How did General Montgomery intend to keep the Axis infantry from withdrawing, and thus preventing his 'crumbling' operation?

To support this attack, Lieutenant-Colonel Fred Hanson (Photo 68), the Chief of Royal Engineers for the 2<sup>nd</sup> New Zealand Division, and his sappers were responsible for breaching four routes up to the forward four infantry battalions that were supposed to take the division's final objective on Phase Line Oxalic. These four routes were to be used to bring forward each infantry battalion's heavy weapons and the supporting tanks of the 9<sup>th</sup> Armoured Brigade such that the forward infantry battalions were ready to meet an armored counterattack at dawn of the first day of the operation. To accomplish this mission, Lieutenant-Colonel Hanson planned for the first, and probably largest minefield to be breached by one sapper section<sup>i</sup> on each of the four routes. Then, another section would pass through and breach any subsequent minefields. This required eight of the nine sapper sections in his three field companies. Lieutenant-Colonel Hanson allocated his engineers as follows: 7<sup>th</sup> Field Company, under Major C. F. Skinner, reinforced with No. 3 Section (under Second-Lieutenant A. G. St. George) of the 6<sup>th</sup> Field Company, was to clear two lanes in the 5<sup>th</sup> Brigade zone. Then, looking southwest across the 900 meter wide corridor reserved for the lanes of the 10<sup>th</sup> Armoured Division, in the 6<sup>th</sup> Brigade zone, Major H. Murray Reid's 8<sup>th</sup> Field Company, reinforced with No. 2 Section (under Lieutenant Claridge) of the 6<sup>th</sup> Field Company, was to clear the other two lanes. In addition, Major Reid noted that each of the infantry battalions was to receive a small detachment of "*sappers to assist the attacking infantry in dealing with any mines or booby traps found and to give any other sapper assistance which might be required.*"<sup>9</sup> The company headquarters and No.1 Section (under Lieutenant Morgan) of the 6<sup>th</sup> Field Company, commanded by Major Woolcott, were to remain with the Divisional Reserve Group. The 5<sup>th</sup> Field Park Company, under Major Anderson, had also been trained in mine detection and lifting as well as carrying out its normal supply functions. Indeed, these supply functions had largely been laid aside recently in favor performing tasks normally assigned to the field companies. The field park's workshop section had been kept particularly busy making mine markers and lane markers as well as helping the LAD ("Light Aid Detachment"), which was essentially a maintenance contact team with vehicle recovery assets to outfit trucks for the divisional signals troops. The stores section of the field park company had its hands full distributing and taking back tapes, lamps, sandbags, explosives, picks and shovels from the field companies and the infantry brigades in support of the ongoing training program.<sup>10</sup>

On 10 September, the 2<sup>nd</sup> New Zealand Division was withdrawn from the front lines and given four days to rest. On 14 September, they began an intensive training program in offensive operations. The New Zealand soldiers knew that they would be one of the assaulting divisions, and that when the breakthrough was made they were also expected to take part in the pursuit. To assist them, the 2<sup>nd</sup> New Zealand Division (having only two infantry brigades) was reinforced by Brigadier John Currie's 9<sup>th</sup> Armoured Brigade and additional artillery regiments (both field and medium). The 9<sup>th</sup> Armoured Brigade, a new formation, was composed of the 3<sup>rd</sup> Hussars Regiment, the Royal Wiltshire Yeomanry Regiment, and the Royal Warwickshire Yeomanry Regiment. Each regiment was equipped with Crusaders as well as the new Sherman and Grant tanks. The 3<sup>rd</sup> Hussars Regiment was a veteran desert unit and the New Zealanders were familiar with many of its officers. The other regiments were 'territorials' (reservists) and new arrivals to the Middle East. Both sides resolved that there was going to be no more problems with tanks and infantry failing to cooperate with each other. To help encourage a spirit of cooperation, General Freyberg gave a dinner party in Alexandria for the senior officers of the division and the 9<sup>th</sup> Armoured Brigade that helped break the ice and develop the trust and confidence needed between them. General Freyberg stated the "*days of infantry being overrun by enemy armour as on 1 December 1941 and 22 July 1942 which brought long lists of prisoners are, I hope, past.*"<sup>11</sup> The armored regiments put the New Zealanders' distinctive emblem, the fern-leaf, on their tanks and vehicles. The New Zealanders sent men to examine and admire the proud tankers' new Shermans. They took every opportunity to get to know each other as well as possible. Above all, they trained together. The leaders performed tactical exercises without troops (T.E.W.T.s) and carried out field training exercises together. Their combined arms training culminated when the infantry brigades, with appropriate supporting units including tanks, deployed in the moonlight of a September night and took part in a full-scale, live-fire dress-rehearsal of the actual mission, including a creeping artillery barrage and close air support.<sup>12</sup>

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<sup>i</sup> A New Zealand engineer section was commanded by a lieutenant and is roughly equivalent to a modern US platoon in size (not a squad).



**PHOTO 67. A 'Scorpion' Troop Moves Up to the Front**



**PHOTO 68. Lieutenant-Colonel 'Fred' Hanson,  
Chief of Royal Engineers, 2<sup>nd</sup> New Zealand Division**



**PHOTO 69. Major Murray Reid,  
Commander, 8<sup>th</sup> Field Company**

General Freyberg described the rehearsals of his 2<sup>nd</sup> New Zealand Division thus: "Time being short, we started our training with a full scale Divisional rehearsal under conditions as similar as possible to the actual attack we were to carry out later to capture Miteiriya Ridge. Complete plans and preparations were made for the 'attack' which we carried out by moonlight on 26<sup>th</sup> September. Actual minefields had been laid in positions corresponding to those in which we expected to find them. The guns had been moved forward by night to positions which had been surveyed and by morning were dug in and camouflaged. The infantry lay up all day. The attack was carried out on a two-brigade front ... in accordance with an artillery-timed programme. To aid the infantry to keep direction, smoke and tracers were fired on the inter-brigade and inter-divisional boundaries. Sappers blew the wire with Bangalore torpedoes and cleared and marked gaps in the minefields. The route was lit, anti-tank weapons, machineguns, and mortars were passed forward and a regiment of tanks went through in support of each brigade.

"Live shell was used, and we had one or two casualties but all ranks gained confidence from the accuracy of the barrage. The new Corps Commander, Sir Oliver Leese, came up and followed the barrage to see for himself.



*“Following this exercise Brigades carried out brigade and battalion training to perfect their drill. Each infantry brigade also carried out a special exercise on the attack in co-operation with tanks supported by artillery, using live ammunition. All weapons were zeroed and the artillery meticulously calibrated.*

*“The more it was examined the more apparent it became that an infantry attack by moonlight over this featureless country covered by minefields, booby-traps, and wire was a difficult and complicated operation.”<sup>13</sup>*

In preparation for the attack, all of the New Zealand soldiers were instructed that casualties were to make their way by walking or litter to one of the four lanes breached by the sappers. After reaching a cleared lane, the walking wounded were to be directed to walk back to the breaches through the first Axis minefield, from there, signs would lead to the medical treatment stations. Ambulances were to be sent forward to evacuate any litter cases.<sup>14</sup>

On 28 September, the original plan for Operation Lightfoot was briefed to the 2<sup>nd</sup> New Zealand Division's senior leaders, including the engineers. After 6 October, General Montgomery called together all officers of the rank of brigadier and above. With a big map, he explained his revision to the original plan for the upcoming battle and his view of the way that it would be fought, in four phases: “the break in,” “the dog-fight,” “the breakthrough,” and “the exploitation.” All of the infantry brigadiers were maliciously pleased when General Montgomery said that he had altered his plan since the tankers were not adequately trained. After this, there were several conferences at the Headquarters of the 2<sup>nd</sup> New Zealand Division, where they sat around the engineers' relief model of Miteiriya Ridge and discussed point by point every phase and detail of their mission. The 2<sup>nd</sup> New Zealand Division was to come under XXX Corps for the initial breach and later, X Corps for the breakthrough and exploitation. General Freyberg and his new G-1, Ray Queree, worked and traveled many hours a day. There was a lot of coordination that had to be done between the two corps. Coordination also had to be made with their neighbors on either flank, the 51<sup>st</sup> Highland Division to the north and the 1<sup>st</sup> South African Division to the south. As a result of these meetings, several conflicts, such as the rate of advance of the barrage, the length and timing of pauses, unit boundaries, and routes, were identified where compromises had to be developed. At length the divisional plan was completed and issued, and the brigades were able to proceed with their own planning.

On 17 October, Brigadier Gentry, commander of the 6<sup>th</sup> New Zealand Brigade, called a conference of his unit commanders and intelligence officers. At this conference, he addressed the up coming operation, using the plaster model of the battlefield to illustrate his instructions. By this time, the New Zealanders had finished their training programs and moved the men to the beach area so that they could swim and relax before the big attack. However, there could be no rest for the senior leaders. They had to reconnoiter their assembly areas and the routes to them and thence to their attack positions. From the line of departure, they stared at their objectives on Miteiriya Ridge, four to six kilometers away. They selected sites for headquarters and holding areas for transports and tanks. Coordination was made between adjacent units. This all had to be accomplished without the units of the 51<sup>st</sup> Highland Division in the line suspecting that anything more than a relief was contemplated.<sup>15</sup> Finally, a few days before the battle, the commanders were given the authority and instructions to explain the 8<sup>th</sup> Army plan to their officers and men, with only a few reservations.

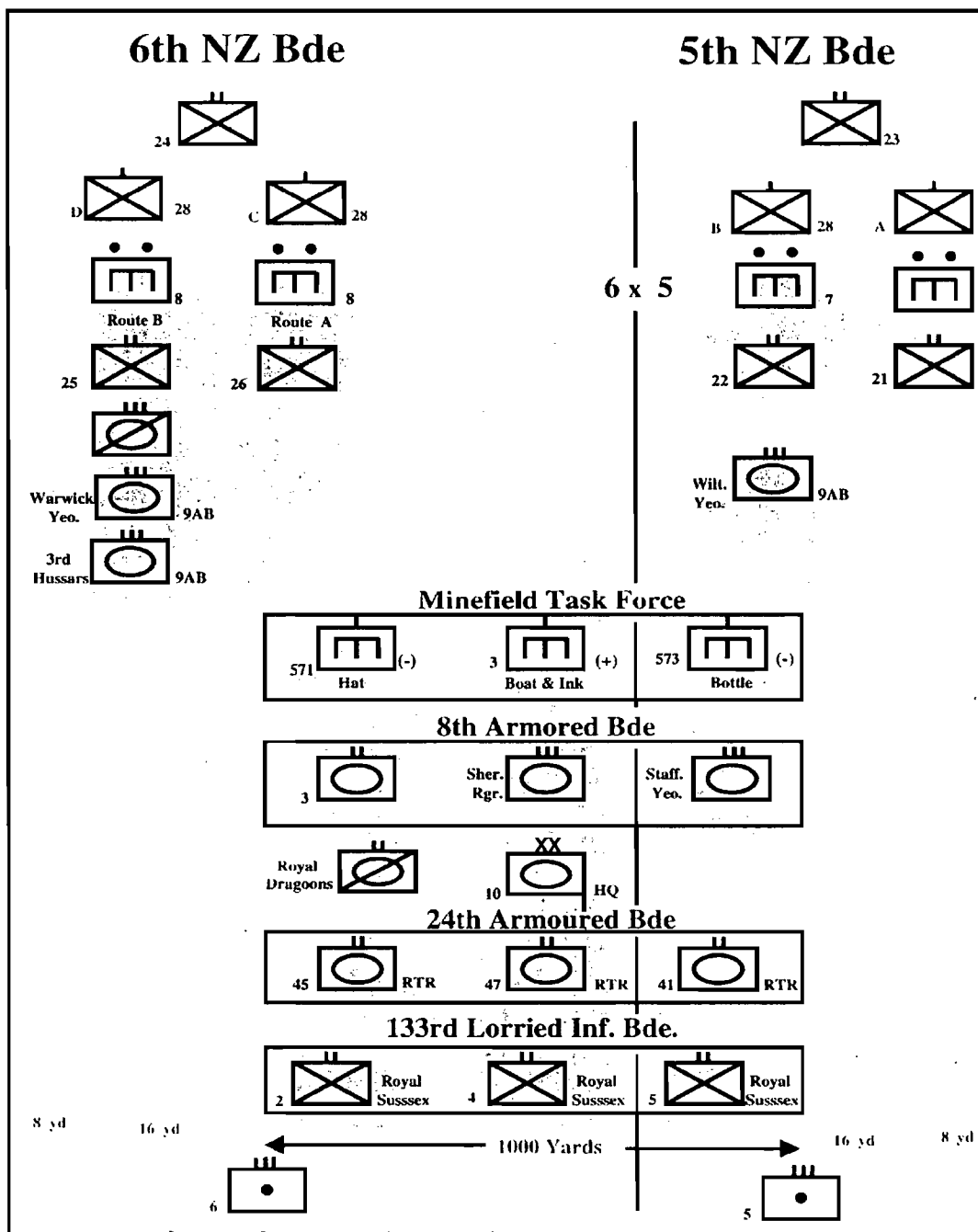
### **6.1.3. BRITISH 10<sup>th</sup> ARMoured DIVISION PLAN<sup>16</sup>**

General Lumsden, the commander of X Corps, was a conservative man. He had had several bad experiences dealing with the *Deutsches Afrika Korps*. Before the upcoming attack, he commented, “*Playing with armour is like playing with fire. You have got to go carefully. It is like a duel. If you don't take your time you will get run through the guts.*”<sup>17</sup> His orders to General Briggs (Commanding General, 1<sup>st</sup> Armoured Division) and General Alec Gatehouse (Commanding General, 10<sup>th</sup> Armoured Division) stated that their divisions, having breached their own lanes through the Axis minefields, were to deploy and advance to Phase Line Pierson. This phase line was approximately 1500 meters west of XXX Corps' infantry on Phase Line Oxalic, along the northern corridor and 3000 meters on the southern corridor. There, the armored divisions were to deploy their trailing motorized infantry brigades, with antitank gun screens, on their open flanks. Once on Phase Line Pierson, General Lumsden intended, after an initial reconnaissance, to advance another five to seven kilometers and take Objective Skinflint, south-east of Tel el Aqqaqir, with the hope of bringing the Axis armor to battle there. Considering the terrain and Axis defensive preparations, it was believed that the best chance of achieving an armored breakthrough lay with the 10<sup>th</sup> Armoured Division in the southern corridor.

According to General Montgomery's operations order, each armored division in General Lumsden's X Corps was responsible for making its own breaches through the Axis minefields. To accomplish this, the advance of the 10<sup>th</sup> Armoured Division to Phase Line Oxalic was to be led by the Minefield Task Force (under the command of Lieutenant-Colonel McMeekan, the division's Chief of Royal Engineers). Unlike the 1<sup>st</sup> Armoured Division, the 10<sup>th</sup> Armoured Division did not provide their sappers with an integral security force to counter any remaining Axis opposition. General Gatehouse believed that the New Zealand infantry, who would advance ahead of his sappers, would provide sufficient protection. Consequently, Lieutenant-Colonel Gilbert R. McMeekan's Minefield Task Force (Table 19) was composed primarily of Royal Engineers, reinforced with only small attachments from the Royal Signal Corps and the military police. There was some risk in this, as Major Moore, commanding the 3<sup>rd</sup> Field Squadron of the 10<sup>th</sup> Armoured Division, observed, "*Sappers can either work or fight, they cannot do both at once.*"<sup>18</sup> The Minefield Task Force was to prepare four lanes (one of which was reserved for return traffic), with an average length of 5,500 meters through two expected Axis minefields. These two Axis minefields were reported to be 250 to 300 meters deep. Considering that the Royal Engineers could only create long, narrow breaches through the Axis minefields in the time available, General Gatehouse was forced to put his entire 10<sup>th</sup> Armoured Division into a formation of three columns, one vehicle wide. His division had to pass approximately 2,400 vehicles (including 280 tanks) and 14,000 men down the three 14.6 meters wide, five to six kilometers long, before they could deploy into battle formation along Phase Line Oxalic.<sup>19</sup>

Lieutenant-Colonel McMeekan's Minefield Task Force was to be followed by the 8<sup>th</sup> Armoured Brigade, then the division headquarters, then the 24<sup>th</sup> Armoured Brigade, and finally the 133<sup>rd</sup> Motorized Infantry Brigade (see Sketch 14). Brigadier Neville Custance arrayed his 8<sup>th</sup> Armoured Brigade with the tanks of the Staffordshire Yeomanry Regiment on Bottle Track (behind the 5<sup>th</sup> New Zealand Brigade). The Sherwood Rangers Regiment, followed by the brigade headquarters, was to move on Boat Track, along the boundary between the 5<sup>th</sup> and 6<sup>th</sup> New Zealand brigades. The 3<sup>rd</sup> Battalion, Royal Tank Regiment was to move along Hat Track, starting near the boundary with the 1<sup>st</sup> South African Division, and was to be followed by the armored cars of the Royal Dragoons Regiment. Next came the division headquarters on 'Boat,' then the 24<sup>th</sup> Armoured Brigade, with the 41<sup>st</sup>, 47<sup>th</sup>, and 45<sup>th</sup> battalions of the Royal Tank Regiment, on tracks Bottle, Boat, and Hat, respectively. The infantry of the 133<sup>rd</sup> Motorized Infantry Brigade was the last of the division's combat units in the movement, with the 5<sup>th</sup>, 4<sup>th</sup>, and 2<sup>nd</sup> battalions of the Royal Sussex Regiment ("The Buffs"), on tracks Bottle, Boat, and Hat, respectively. Each column consisted of 400 vehicles or more, with an estimated length of sixteen kilometers. An additional track for return traffic (such as ambulances and empty logistics vehicles), called 'Ink,' was to be cleared in the middle, just to the right of Boat Track.<sup>20</sup>

Lieutenant-Colonel Gilbert McMeekan, the Chief of Royal Engineers for the 10<sup>th</sup> Armoured Division, was new to his job, having arrived on 31 September 1942.<sup>21</sup> He was very fortunate in that he had inherited a number of experienced sappers. The 10<sup>th</sup> Armoured Division was assigned the 2<sup>nd</sup>, 3<sup>rd</sup>, and 6<sup>th</sup> field squadrons as well as the 141<sup>st</sup> Field Park Squadron. However, all of these were short men, with an average strength of 36 sappers per troop (out of 64 authorized). These units were from Cheshire County, between Liverpool and Manchester, and were composed of 'territorials' (reservists) with a large number of the original recruits coming from the New Brighton Rugby Football Club. The 3<sup>rd</sup> Field Squadron was commanded by Major Peter Moore (Photo 71), the outstanding sapper officer who had run the 8<sup>th</sup> Army's Minefield Clearance School and had devised the new standard breaching drill. That drill would soon be subjected to a most severe test. The 3<sup>rd</sup> Field Squadron already had a fine record, having fought in the brief, turbulent campaign in Greece as well as up and down the Western Desert. They had recently had a rough time in the First Battle of El Alamein; having been pressed into mine clearance tasks in poorly planned operations. Major Moore was blessed with a good set of officers and non-commissioned officers in his squadron.



SKETCH 14. Array of Allied Forces, 2NZ Div Zone, Phase 1





**PHOTO 71. Major Peter Moore, Commander of the British 3<sup>rd</sup> Field Squadron,  
Royal Engineers, 10<sup>th</sup> Armoured Division**

Since these squadrons were quite insufficient for the engineering tasks ahead, the division had been reinforced with additional engineer units for the attack. These were the 571<sup>st</sup> Army Field Company from Devon and Cornwall (under Major Yeates) and the 573<sup>rd</sup> Army Field Company (under Major Brinsmead). For the initial stage of the upcoming attack, the 6<sup>th</sup> Field Squadron, under Major Collins, had been placed directly under the command of the 24<sup>th</sup> Armoured Brigade. While Major Perrott's 2<sup>nd</sup> Field Squadron was assigned to the 8<sup>th</sup> Armoured Brigade, which was to assemble on the Springbok Road. The three Scorpions allotted to the 10<sup>th</sup> Armoured Division were loaned for the first night of Operation Lightfoot to the 2<sup>nd</sup> New Zealand Division.

As a result of this task organization, only three field companies remained from which to form the backbone of Lieutenant-Colonel McMeekan's Minefield Task Force for the first night's attack. This task force was required to clear four 7.3-meter (8-yard) gaps, later to be widened to 14.6 meters (16-yards) on a 900-meter wide front. These were a continuation of the XXX Corps' Bottle, Boat and Hat tracks, and the spare route, 'Ink.' In such a narrow area, navigational errors had to be avoided. It was one thing to maintain an accurate compass heading and pace count when moving unimpeded, but is considerably more difficult in the stop-and-go action of a night breach under fire.

Major Brinsmead's 573<sup>rd</sup> Army Field Company (less one section) was responsible for clearing Bottle Track on the right. Major Moore's 3<sup>rd</sup> Field Squadron (plus one section from the 573<sup>rd</sup> Army Field Company) took Ink and Boat in the center (with Ink just to the right of Boat). Major Yeates' 571<sup>st</sup> Army Field Company (less one section) took Hat on the left. The two army field companies were supposed to revert to the control of X Corps as soon as the breaches were complete. These routes had to be cleared all the way through to the final objectives of XXX Corps, beyond Miteiriya Ridge along Phase Line Oxalic. A reserve, formed mainly from Major Carr's 141<sup>st</sup> Field Park Squadron, reinforced with one section from the 571<sup>st</sup> Army Field Company, was placed under Major Carr and would follow Major Moore's squadron on Boat Track. Based on available intelligence, the British sappers expected to have to breach two Axis minefields. The first one was known to be about 1,200 meters beyond their start line, while the second one was reported to be 1,500 meters beyond the first.

Lieutenant-Colonel McMeekan prepared his sappers for the approaching operation by having Major Carr's 141<sup>st</sup> Field Park Squadron emplace two dummy minefields. These were then breached at night by the field squadrons along a pre-determined bearing. The field squadrons were required to perform this drill every other night.

#### 6.1.4. 6<sup>th</sup> NEW ZEALAND BRIGADE PLAN

The critical artillery support, required by the 6<sup>th</sup> New Zealand Brigade attack to Phase Line Oxalic, was to be provided by the 6<sup>th</sup> and part of the 4<sup>th</sup> field artillery regiments of the Royal New Zealand Artillery. The 6<sup>th</sup> Field Regiment would fire preplanned concentrations on known or suspected hostile positions while about half of the 4<sup>th</sup> Field Regiment fired a lifting barrage. Behind this lifting artillery barrage, the Lieutenant-Colonel Gwilliam's 24<sup>th</sup> Infantry Battalion, (under strength with only three of its four authorized rifle companies) would attack to capture the first objective in the brigade's sector. As stated earlier, each infantry battalion was supported by a small party of sappers, which was attached for handling any light combat engineering tasks the infantry needed done. Their objective was 2,700 meters forward of the start line and 1,300 meters behind the first Axis minefield, which was defended by the line of German combat outposts. This intermediate objective, along Phase Line Red, was merely a mark on the map. There were no distinguishing terrain features that would make it identifiable, particularly at night. Lieutenant-Colonel Gwilliam planned to attack with A Company on the right, B Company on the left, and C Company back, in support. The Maoris of C and D companies of Lieutenant-Colonel Baker's 28<sup>th</sup> Infantry Battalion, were initially to follow the lead of the 24<sup>th</sup> Infantry Battalion and were responsible for mopping up any bypassed outposts.<sup>22</sup> This was intended to allow Major Murray Reid (Photo 69) and his sappers from the 8<sup>th</sup> Field Company (reinforced by No. 2 Section, 6<sup>th</sup> Field Company and three Scorpions) to breach two gaps in the left portion of the 6<sup>th</sup> Brigade zone, about 500 meters apart through the two expected Axis minefields without interference.<sup>1</sup>

The two lanes to be breached by the sappers had a total length from the line of departure to Phase Line Oxalic of about 4,600 meters each. These were called Route 'A,' on the north and Route 'B,' on the south. Next, the lanes would be marked with lights and fenced for the trucks and tanks supporting each brigade for the entire distance from the line of departure to the division's final objectives along Phase Line Oxalic. Each of the three Scorpions attached to the 8<sup>th</sup> Field Company would require a volunteer New Zealand sapper to ride outside the hull and operate the flail device in combat. To assist each breaching element, a small reconnaissance party of sappers was assigned to accompany the 24<sup>th</sup> Infantry Battalion as far as the first minefield and to place a shaded blue light at the edge of it for the guidance of the clearing parties.<sup>23</sup> Four other routes, reserved for the 10<sup>th</sup> Armoured Division, were to be cleared by their assigned or attached Royal Engineers in the middle of the 2<sup>nd</sup> New Zealand Division's zone (three of these routes ran through the right side of the 6<sup>th</sup> Brigades zone or immediately adjacent to it).<sup>24</sup> The New Zealand sappers were then followed by a detachment of military police from the divisional provost company who were responsible for traffic control through the narrow lanes.

These elements of the military police company were initially followed by the 25<sup>th</sup> and 26<sup>th</sup> infantry battalions, under lieutenant-colonels Ian Bonifant and Dennis Fountaine, respectively. These two infantry battalions were also under strength and had only enough trained infantry to man three rifle companies each (of four authorized). They were to pass through the sappers and the 24<sup>th</sup> Infantry Battalion after the intermediate objective was seized, and to continue the attack along a gradually expanding front to the division's final objective on Miteiriya Ridge. In addition to each battalion's organic equipment, which typically consisted of 31 Universal Carriers and 57 other vehicles, each of these battalions had been reinforced with a 'slice' of divisional assets. These heavy weapons consisted of one troop of 6-pounder antitank guns, a platoon of heavy, water-cooled Vickers Machine Guns, and a troop of three Crusader tanks from A Squadron of the Royal Warwickshire Yeomanry Regiment. These Crusader tanks were to support the infantry and assist in mopping-up Axis outposts. In due course, as the attack progressed, each infantry battalion's heavy weapons and vehicles would be ordered forward, as far as the first Axis minefield, under brigade control and would then be guided forward from there by their respective battalions.<sup>25</sup> Following behind the 25<sup>th</sup> Infantry Battalion's heavy weapons on Route 'B' were the Stuart Tanks and Bren Gun Carriers of the Divisional Cavalry Regiment. These were followed by the main body of the Royal Warwickshire Yeomanry Regiment, led by the rest of A Squadron followed by the heavy squadrons, which were equipped with the American-made Shermans and Grants. After the 2<sup>nd</sup> New Zealand Division's final objective was captured, the Divisional Cavalry Regiment was supposed to pass through the 6<sup>th</sup> Brigade's forward positions and exploit to the south and southeast. The attached British 9<sup>th</sup> Armoured Brigade would also pass through to exploit south, or if necessary, to help resist any Axis counter-attacks.<sup>26</sup>

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<sup>1</sup> Question 8: Are Operations Orders (or similar documents) for the 2<sup>nd</sup> Battle of El Alamein available for XXX Corps, X Corps, 2<sup>nd</sup> New Zealand Division, 10<sup>th</sup> Armoured Division, 6<sup>th</sup> New Zealand Brigade, 9<sup>th</sup> Armoured Brigade, and 8<sup>th</sup> Armoured Brigade?



During the first phase of the attack, A Company, 24<sup>th</sup> Infantry Battalion was responsible for maintaining contact with the adjacent 5<sup>th</sup> Brigade, which was supposed to be advancing simultaneously on their right to Phase Line Red. In the second phase, C Company, 26<sup>th</sup> Infantry Battalion was responsible for contact with the 5<sup>th</sup> Brigade from Phase Line Red to Phase Line Oxalic. However, on the 6<sup>th</sup> Brigade's left, the plan of the 1<sup>st</sup> South African Division called for their forces to advance more slowly. It was expected that the 6<sup>th</sup> Brigade would not be able to link up with them until later in the operation, thus leaving the 6<sup>th</sup> Brigade's left flank somewhat unsecured<sup>i</sup>

In preparation for the attack, a number of other important details had to be dealt with. These included selecting code words and pyrotechnic signals for this operation. The signal for the successful seizure of the first and second objectives was to be a yellow star cluster. The 'SOS' signal was a rocket with three white stars and a notable tail. The infantry to tank recognition signal was red tracer fired vertically. And the ground to air recognition signals were either blue smoke or an Aldis (signal) lamp letter 'G' while target reference points were to be marked with red smoke or an Aldis lamp letter 'V'.<sup>27</sup>

While preparing for their attack, the New Zealanders lacked accurate detailed information on the dispositions of Axis forces in their zone (Map 7). The front line Axis infantry battalions had been withdrawn back to their new defensive positions about 20 October. These were effectively screened by their combat outpost line and the Devil's Gardens. The New Zealanders believed that a battalion from the German 164<sup>th</sup> *Leicht Afrika* Division and a company of Italians from the 102<sup>nd</sup> *Trento* Division were well dug in behind wire entanglements on Miteiriya Ridge in the division zone. It was reported that these positions were well supported by a screen of heavy machine guns, mortars and antitank guns. In addition, extensive minefields had been identified on both sides of the ridge. Between the two known defensive lines, other uncharted minefields and an unknown number of machine gun nests were expected. Indeed, the obstacle reconnaissance effort in the XXX Corps sector was impeded by security requirements, as described by Lieutenant-Colonel McMeekan, Chief of Royal Engineers, 10<sup>th</sup> Armoured Division, *"We now encountered the second staff blunder: when I arranged for R. E. patrols to motor up the fifteen miles to Alamein after dark each night, and to go out across No-Man's-Land on foot to recce our front, the Highlanders in the line objected strongly, as, to prevent leakage of information through casualties or captures in the enemy minefield, they had orders that no member of X Corps was to be allowed forward of our wire. In fact, the New Zealand infantry and sappers were likewise prohibited. We did manage to get patrols out the first night, conforming to our own divisional orders, but after that it was stopped."*<sup>28</sup> Nevertheless, an American observer with the 1<sup>st</sup> Armoured Division, X Corps, reported, *"The approximate location of the enemy minefields was determined by ground and aerial reconnaissance. Front line patrolling by RE units disclosed the forward edge of the fields. Aerial photographs of the area were studied, and these, together with knowledge of previous German methods and contour maps giving details of the terrain, provided an outline of the fields that proved quite close to the real situation. There were found to be three main belts in the enemy minefields. Each belt averaged about 200 yards in extent and contained irregularly scattered mines. Back of each belt were five, ten, or fifteen rows of mines. The fronts of the German minefields were unmarked. The rear boundaries were marked with wire or by warning signs."*<sup>29</sup>

As stated earlier, General Montgomery intended his armor to pass through the infantry before the *panzerarmee* could regroup and counter-attack. Behind El Wishka Ridge, west of Miteiriya, the *panzerarmee* was believed to have concentrated most of their light and heavy artillery, including reportedly approximately seventy of the famous 88-millimetre guns.<sup>31</sup> By deepening his defenses and equipping his troops with a high proportion of

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<sup>i</sup> Lieutenant-Colonel F. J. Gwilliam, commander of the 24<sup>th</sup> Infantry Battalion reported that, *"On the day prior to the attack I conferred with the Officer Commanding the South African troops, and he advised me that they did not intend to attack under cover of a barrage, but were going to place heavy artillery concentrations at certain known strong points of the enemy and then endeavour to dislodge the enemy from these strong points by an infantry attack. The attack therefore was not on a time basis, and meant that the infantry had to move backwards and forwards across their frontage in order to cope with the enemy's strong points in their sector."* However, this South African unit, Lieutenant-Colonel S. E. V. Quin's Capetown Highlanders, had been ordered to capture three strong points at times that should have kept them roughly parallel with the New Zealanders' advance. *24 Battalion*, page 125.

<sup>ii</sup> *26 Battalion*, by Frazer D. Norton, Official History of New Zealand in the Second World War 1939-45, War History Branch, Department of Internal Affairs, Wellington, New Zealand, 1952, page 185. In fact, German situation maps and Order of Battle indicate that none of the famous 88's were forward deployed in an antitank roll in the zone of the 2<sup>nd</sup> New Zealand Division at the beginning of the battle. Nevertheless, according to the *Kriegstagebuch* of the 15<sup>th</sup> Panzer Division, there were four '88's from the 2<sup>nd</sup> Battery, I Battalion, 43<sup>rd</sup> Flak Regiment, tasked with providing anti-aircraft support and assigned to *Kampfgruppe Sud*.



automatic weapons, the “Desert Fox” had presented his attackers with a formidable task.<sup>30</sup> General Freyberg commented, “*The enigma of the attack was the strength of the enemy defences on the far side of Miteiriya Ridge.*” He also noted that, “*Behind the positional troops, two German Panzer Divisions, one in the north and one in the south, and the Italian armour were held in readiness to give a mobile defence in depth to any point or points which might be threatened. There were two definite lines of defences and behind them a third line of defended localities for anti-tank guns, and dug-in positions for tanks.*”<sup>31</sup> As Brigadier Howard Kippenberger, Commander of the 5<sup>th</sup> Brigade, stated, “*We knew that the enemy positions opposite us were held by the German 164<sup>th</sup> Division and the Italian Trento Division, and were in great depth. We had no information about actual dispositions except what could be deduced from air photographs. It was evident that opposition would stiffen as we advanced and Miteiriya Ridge itself was solidly held.*”<sup>i</sup>

### 6.1.5. AXIS FORCES IN THE 2<sup>nd</sup> NEW ZEALAND DIVISION ZONE

Actually manning the combat outpost line and the main line of resistance opposing XXX Corps’ dismounted attack were *Generalmajor* Karl Lungerhausen’s German 164<sup>th</sup> *Leicht Afrika* Division and the Sicilians of General Giorgio Masina’s 102<sup>nd</sup> *Trento* Infantry Division (maps 8 & 9, see also sketches 3-6). When the 164<sup>th</sup> *Leicht Afrika* Division had first arrived in North Africa from Crete in July, it was considered to be un-acclimated, poorly trained and ill-equipped (indeed, they had arrived with bicycles for transportation). Now, they and *Generalmajor* Lungerhausen were responsible for the entire northern sector. The 102<sup>nd</sup> *Trento* Division, as well as, the counterattack force (composed of the 15<sup>th</sup> Panzer and 133<sup>rd</sup> *Littorio* Armored divisions) to the west of the forces in the main line of resistance was directed to ‘cooperate’ with the 164<sup>th</sup> *Leicht Afrika* Division.<sup>ii</sup>

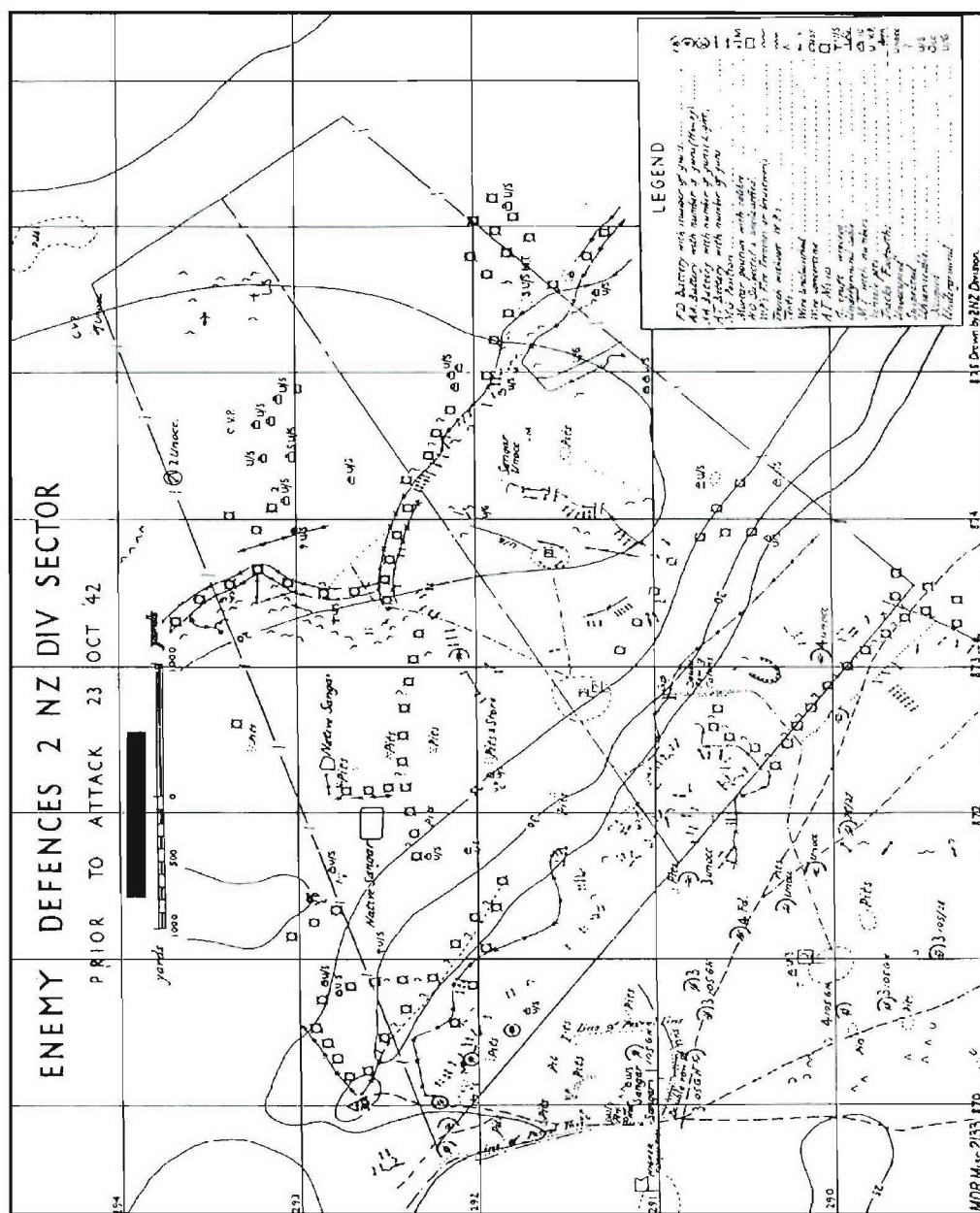
The mission of the 2<sup>nd</sup> New Zealand Division required them to breach portions of mine boxes L and K. Mine Box L (called ‘Pistoia’ by the Italians) had been completed by *Leutnant* Laurenz’ 2<sup>nd</sup> Company, while Mine Box K (called ‘Venezia’ by the Italians) was completed by *Leutnant* Junkersdorf’s 1<sup>st</sup> Company, both of *Hauptmann* Streitz’ 220<sup>th</sup> Pioneer Battalion, 164<sup>th</sup> *Leicht Afrika* Division.<sup>32</sup> As a result of the pioneers’ efforts, the zone for the 2<sup>nd</sup> New Zealand Division’s attack contained an estimated 14,000 antitank mines reinforced with an indeterminate number of antipersonnel mines and improvised explosive devices as well as about sixteen kilometers of wire obstacles. The antitank mines were primarily emplaced in two main belts. In the first belt to be encountered by the New Zealanders, the antitank mines had been emplaced by Italian engineers, at a density of about one mine per meter of front. In the second belt, which had recently been completed by the 220<sup>th</sup> Pioneer Battalion, the antitank mines had been emplaced at a density of one mine per two meters of frontage. The two main mine belts were connected by two lateral belts, which formed the boundaries of mine boxes K and L, in effect, forming another box (see Map 8). In addition, there were short, spur minefields projecting off the main belts in places as well as randomly scattered antitank mines laid in front of and between the main mine belts. The antitank mines were reinforced with some antipersonnel mines. These were in relatively short supply, and were typically laid at a density of one mine per meter of front. In the 6<sup>th</sup> Brigade zone, antipersonnel mines were primarily emplaced in two belts. The first belt of pressure fuzed antipersonnel mines was emplaced in front of the first belt of antitank mines, to strip away or delay any dismounted infantry or sappers in the event of a tank/infantry attack. The second belt of antipersonnel mines was emplaced just behind the first mine belt. About half of those antipersonnel mines in the second belt were tripwire fuzed. To make up for the shortage of antipersonnel mines in this area, the pioneers had emplaced eighty-two improvised explosive devices (mostly booby-trapped aircraft bombs). These were located toward the rear of Mine Box L along the front slope of Miteiriya Ridge on the 5<sup>th</sup> Brigade’s right flank (although not all of these were in the 2<sup>nd</sup> New Zealand Division Zone). Another 156 of these deadly contrivances were emplaced along 6<sup>th</sup> Brigade’s left flank in Mine Box K (Map 4). These were emplaced in a checkerboard fashion on ten-meter centers.<sup>iii</sup>

<sup>i</sup> So far, the author has not been able to locate any specific information on what intelligence that the 8<sup>th</sup> Army had on *Kampfgruppe Sud*. See *Infantry Brigadier*, by Howard Kippenberger, Oxford University Press, New York, 1949, page 227 and *Alam Halfa and Alamein*, pages 250-251. Although some of the eyewitness accounts of this subject are contradictory, it should be noted that Lieutenant-Colonel McMeekan, Chief of Royal Engineer for the 10<sup>th</sup> Armoured Division, remarked, “*Even the last minute intelligence was excellent—maps showed all the landmarks and minefields, every derelict tank, every bit of wire.*” In “The Assault at Alamein,” page 326.

<sup>ii</sup> Question 9: Are Operations Orders (or similar documents) for the 2<sup>nd</sup> Battle of El Alamein available for the 164<sup>th</sup> *Leicht Afrika* Division, the 15<sup>th</sup> Panzer Division, the 102<sup>nd</sup> *Trento* Division, or the 133<sup>rd</sup> *Littorio* Armored Division?

<sup>iii</sup> Although the available records of the *panzerarmee* are not completely clear, in the 164<sup>th</sup> *Leicht Afrika* Division’s entire sector, a total of at least 11,400 S-mines were emplaced, at an average density of about 1 mine per meter. In addition, 1,140 improvised explosive devices and 6,000

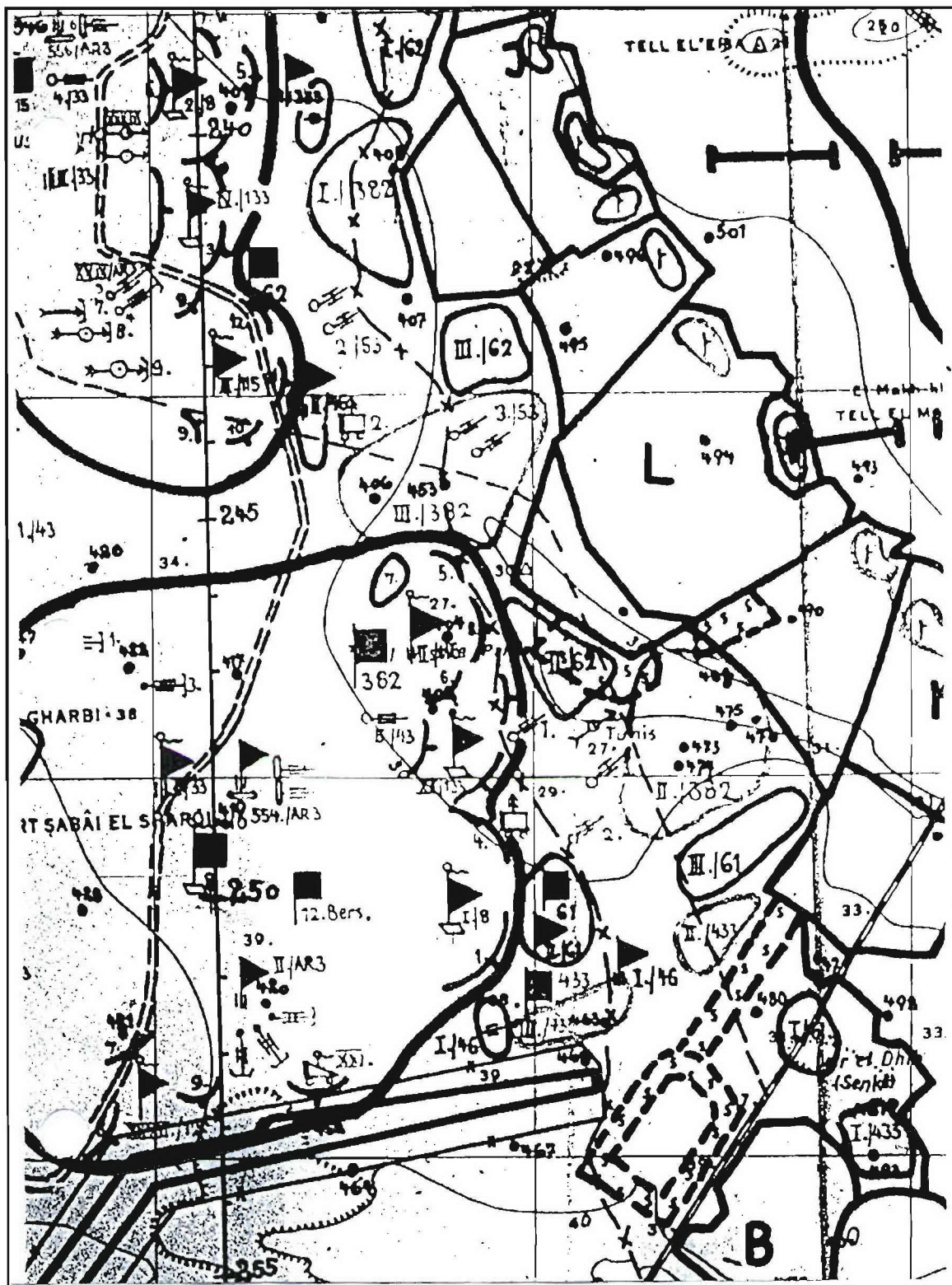
At the time of the attack, the forward outposts in this sector were manned by the Rheinlanders of the 7<sup>th</sup> Company of *Oberst Hirsch's* 382<sup>nd</sup> Grenadier Regiment from Wehrkreis XII (the area around Wiesbaden). The main line of defense for the Axis in this area was about 3,000 meters behind the outposts and ran mostly along the reverse slope of the Miteiriya Ridge, a gentle roll in the ground barely 5 to 6 meters above the surrounding desert. From northwest to southeast, this ridge was defended by Captain Manassei's Italian II Battalion, 62<sup>nd</sup> Infantry Regiment, *Hauptmann Alfred Krupfganz's* German II Battalion, 382<sup>nd</sup> Grenadier Regiment, and Captain Attilio Caimi's Italian III Battalion, 61<sup>st</sup> Infantry Regiment, with the Italian II Battalion, 61<sup>st</sup> Infantry Regiment in local reserve.<sup>33</sup>



MAP 7. Known and Suspected Axis Defenses, 2<sup>nd</sup> New Zealand Division Zone

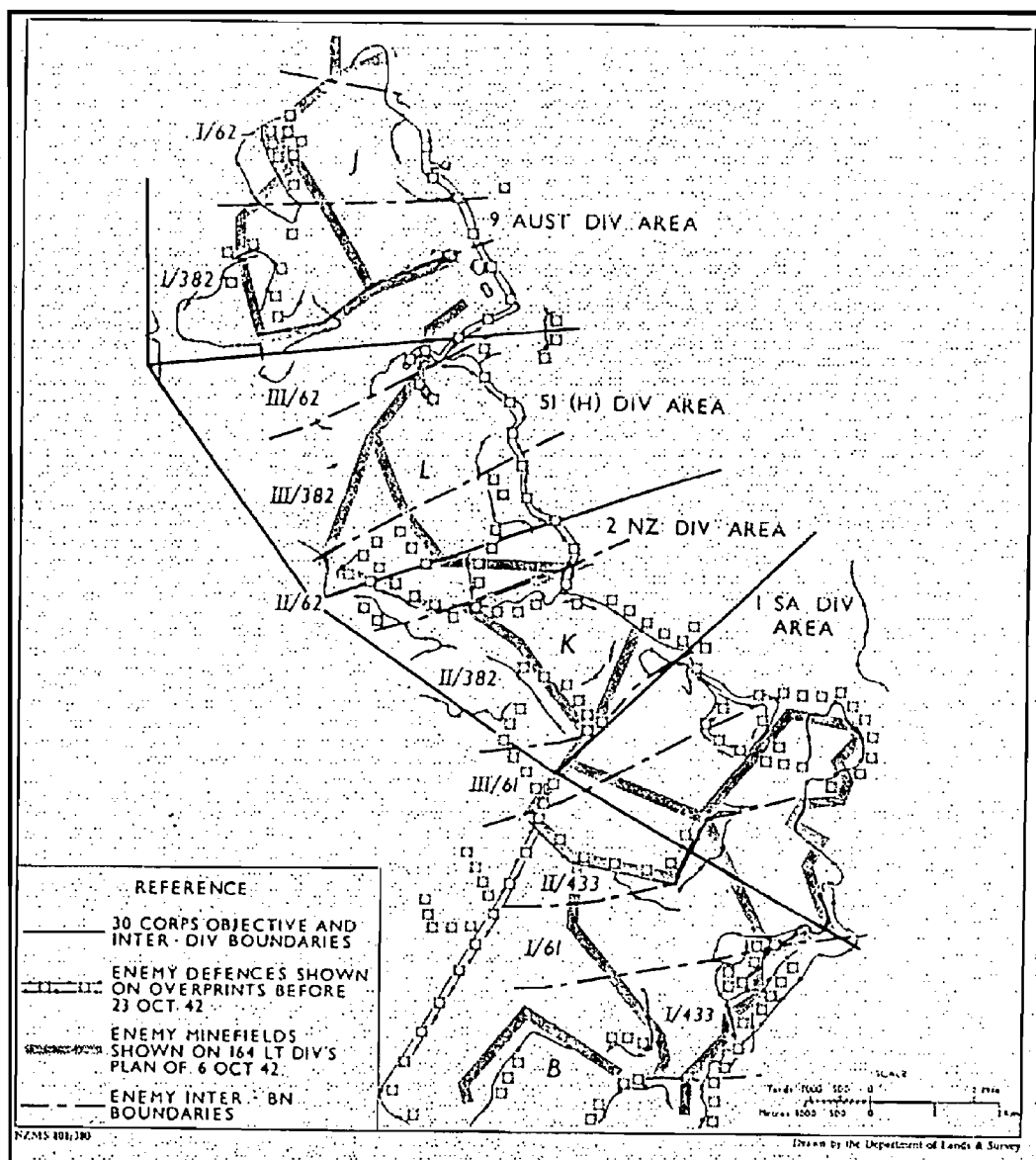
rolls of barbed wire were emplaced. *Das Deutsche Afrika-Korps, Sieg und Niederlage*, by Hanns Gert von Eisebeck, Limes Verlag, Wiesbaden, Germany, 1949, page 138.





MAP 8. Actual Axis Defenses in 2<sup>nd</sup> New Zealand Division Zone  
(See Annex 3, Appendix E for an explanation of German military symbology)





**MAP 9. Comparison of Templated Versus Actual Axis Minefields in XXX Corps Zone**

Each of the three battalions on the main defensive line had three companies to defend a frontage of about 2000 meters each, with their fourth company forward on outpost duty (Table 23). This 'corseting' of Axis infantry battalions, combined with their redeployment (around 20 October) to this new main line of resistance, made it very difficult for Allied intelligence to accurately differentiate divisional sectors.<sup>34</sup> Captain Attilio Caimi was a seasoned reservist. Colonel Sillavengo, commander of the XXXI Sapper Battalion, described him as, "*a dynamic but somewhat silent man.*" His unit, III Battalion, 61<sup>st</sup> Infantry Regiment, was considered to be the best infantry unit in the 102<sup>nd</sup> Trento Division.<sup>35</sup>

Direct support artillery for these units was provided by I Battalion, of Oberst Schieb's 220<sup>th</sup> Field Artillery Regiment (with 12 10.5cm le FH 18s in three batteries of four howitzers) and the Italian III Battalion, 46<sup>th</sup> Field Artillery Regiment (with 12 75/27 guns in three batteries of four guns). These were reinforced by the twelve 10.5cm howitzers of Hauptmann Freiherr von Grote's I Battalion, 33<sup>rd</sup> Panzer Artillery Regiment, attached to *Kampfgruppe Sud*.<sup>36</sup> In addition, General Alessandro Gloria's Italian XXI Corps had 40 medium and 14 heavy guns in the corps' 8<sup>th</sup> Artillery Regiment. Also, Generalmajor Weber's 104<sup>th</sup> ARKO (Army Artillery Command) was available with 62 heavy guns, in general support to the entire Corps front.

**TABLE 23. STRENGTH OF AXIS MAIN LINE OF DEFENSE IN 2<sup>nd</sup> NEW ZEALAND DIVISION ZONE\*\***

Infantry Bns	Origin	Manpower (officer/enlisted)	Rifle Companies	Antitank Guns	Antitank Rifles	Heavy Machine Guns	Light Machine Guns	Mortars
II/62 <sup>nd</sup>	Italian	30/500	4	10 X 47/32	8 X 20mm	11	24	4 X 81mm (?)
II/382 <sup>nd</sup> *	Ger	24/800	4	5 X 5cm PAK 38 4 X 3.7cm PAK 36	-	12	36	6 X 8cm
III/61 <sup>st</sup>	Italian	25/450	4	6 X 47/32	7 X 20mm	8	24	4 X 81mm (?)
II/61 <sup>st</sup>	Italian	25/450	4	-	9 X 20mm	12	26	4 X 81mm (?)

\*The New Zealand artillery fire plan showed that the 7<sup>th</sup> Company was reinforced with four 7.5cm le IG (light infantry guns), if present, these were probably from the 13<sup>th</sup> (Infantry Gun) Company, 382<sup>nd</sup> Grenadier Regiment (however, there appears to be no mention of their use or capture in any of the accounts of the attack).

\*\* The actual 'on-the-ground' strength was probably about 75% of the strengths given above because each battalion (except II Battalion, 61<sup>st</sup> Infantry Regiment) had one of its four companies on outpost duty. The 7<sup>th</sup> Company, II Battalion, 62<sup>nd</sup> Infantry Regiment was mostly in the 51<sup>st</sup> Highland Division zone while the 11<sup>th</sup> Company, III Battalion, 61<sup>st</sup> Infantry Regiment was in the 1<sup>st</sup> South African Division zone. See *Le Operazioni in Africa Settentrionale, Vol III-EI Alamein*, pages 724 to 727.

As a result of their decision to defend primarily from the reverse slope of Miteiriya Ridge, most of the Axis units in the main line of defense would not be able to engage the breach force, on the other side of the ridge, with direct fire. Therefore, the minefields in this sector were covered principally by the Rheinlanders of the 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment, manning the combat outpost line. Spread out in squad size positions behind the first Axis minefield, the Rheinlanders would initially be outnumbered 8 to 1. Plainly, they could not be expected to resist for long. Once these outposts were eliminated, Allied breaching operations against the unprotected minefields, west of the outpost line, in this zone, could basically proceed without interference from direct fire or observed indirect fire.

Nevertheless, it could prove to be very difficult to dislodge the defenders from behind the ridge since the 8<sup>th</sup> Army's units would be silhouetted against the eastern sky as they crossed the crest of the ridge. The Allies would also be exposed to heavy firepower while slowly attempting to mass and deploy their combat power from the long, narrow breach lanes prior to directly engaging the defenders. As the 10<sup>th</sup> Armoured Division reached the end of their four breach lanes through the minefields, they would be forced to engage the Axis defenders with their tanks one abreast and the columns separated by two to three hundred meters. However, this difficult mission had to be accomplished before the 10<sup>th</sup> Armoured Division could complete its forward passage of lines and continue the attack to their objective, Phase Line Pierson. Nevertheless, this was not by design, General Montgomery had intended for his leading infantry divisions to overrun the main defensive area and capture the first Axis gun line before passing the armor forward. However, in the 'fog of war,' he placed Phase Line Oxalic, along which the XXX Corps' divisional objectives ran, within the main defensive positions of the Axis and well short of their gun line.<sup>37</sup>

*Kampfgruppe Sud* (Table 24), the local Axis counterattack force, was a composite unit made up of elements from *Generalmajor* Gustav von Vaerst's 15<sup>th</sup> Panzer Division working in cooperation with elements from General Gervasio Bitossi's 133<sup>rd</sup> *Littorio* Armored Division. This *kampfgruppe* was placed under the direction of *Oberst* Willi Teege, Commander of the 8<sup>th</sup> Panzer Regiment, and was stationed just behind the Italian II Battalion, 61<sup>st</sup> Infantry Regiment. *Oberst* Teege was responsible for counterattacking any breakthroughs or penetrations of the main line of defense in this sector. This *kampfgruppe* was composed of *Hauptmann* Weichsel's II Battalion 115<sup>th</sup> Panzer Grenadier Regiment, XII Tank Battalion from Colonel Giuseppe Bonini's 133<sup>rd</sup> Armored Regiment, *Hauptmann* Otto Stiefelmayer's I Battalion, 8<sup>th</sup> Panzer Regiment, and XXXVI Battalion, of Colonel Amoroso's 12<sup>th</sup> *Bersaglieri* Regiment. The first three of these units were deployed closest to the defenders of Miteiriya Ridge. The German contingent of the *kampfgruppe* was from the area around Kaiserslautern (Wehrkreis XII). To conceal their equipment, the Germans improvised camouflaged boxes for their tanks and guns from camel thorn and barbed wire.

Three battalions of artillery supported this *kampfgruppe*: I Battalion, from *Oberst* Crasemann's 33<sup>rd</sup> Panzer Artillery Regiment; II Battalion, 3<sup>rd</sup> *Celere* Artillery Regiment; and DLIV (554<sup>th</sup>) Self-propelled Artillery Battalion. The I Battalion, 33<sup>rd</sup> Panzer Artillery Regiment was equipped with twelve 10.5cm le FH 18s (light field howitzers) in three batteries of four howitzers. The II Battalion, 3<sup>rd</sup> *Celere* Artillery Regiment was equipped with twelve 75/27

guns in three batteries of four guns. The DLIV (554<sup>th</sup>) Self-propelled Artillery Battalion was equipped with eight 75/18 *Semovente* assault guns in two batteries of four guns.<sup>i</sup>

In addition, there appears to have been a motorized engineer company (probably from the 1<sup>st</sup> or 2<sup>nd</sup> company from *Hauptmann Streitz*' 220<sup>th</sup> Pioneer Battalion) deployed between the XII Battalion, 133<sup>rd</sup> Armored Regiment and the I Battalion, 8<sup>th</sup> Panzer Regiment (Map 8). For local air defense, the *Luftwaffe*'s 5<sup>th</sup> Battery, I Battalion, 43<sup>rd</sup> Flak Regiment with seven 2cm flak guns and one quad 2cm flak gun was stationed behind the XII Battalion, 133<sup>rd</sup> Armored Regiment. In addition, four of the dreaded '88's of the 2<sup>nd</sup> Battery, I Battalion, 43<sup>rd</sup> Flak Regiment were stationed in the rear area of the *kampfgruppe*, as mentioned earlier, in an antiaircraft role.<sup>38</sup>

**TABLE 24. STRENGTH OF AXIS COUNTERATTACK FORCES  
IN 2<sup>nd</sup> NEW ZEALAND DIVISION ZONE**

Maneuver Battalions	Origin	Tanks	Antitank Guns*	Antitank Rifles	Heavy Machine Guns	Light Machine Guns	Mortars
I/8 <sup>th</sup> Panzer	Ger	8 Pz IVf2 (lg), 14 Pz IIIj (lg), 23 Pz III (kz), 3 Pz II					
XII/133 <sup>rd</sup> Armored	Italian	34 M14					
II/115 <sup>th</sup> Pz Grenadier	Ger		6 x 5cm PAK 38		9	38	4 x 8cm
XXXVI/12 <sup>th</sup> Bersaglieri	Italian		6 x 47/32	5 x 20mm	6	7	

\* There were also four 88 Flak 18 dual purpose (antiaircraft/antitank) guns of the 2<sup>nd</sup> Battery, I Battalion, 43<sup>rd</sup> Flak Regiment assigned to the *kampfgruppe* in an antiaircraft role.

The New Zealanders' intelligence (maps 7 and 11) showed approximately sixteen antitank guns, four 75mm light infantry guns, two or three mortars, and thirty machine guns in the combat outposts in the sector of the 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment. Actually the 7<sup>th</sup> Company had about 200 men equipped with only three heavy machine guns and nine light machine guns (the number of mortars and antitank guns could not be determined). In addition, significant portions of the minefields had not been detected (Map 9).

#### 6.1.6. DEUTCH-ITALIENISCHEN PANZERARMEE WAITS

Entries in the *panzerarmee*'s diaries and reports to the OKH (*Oberkommando des Heere*, Army High Command) provide an indication of *General der Kavallerie* Stumme's deductions and expectations for the approaching battle commenced. For example, on 3 October, he informed Marshal Cavallero that recent British activities around Munassib, their amphibious raid on Tobruk, and their long-distance raiding into Libya all pointed toward a major British offensive. On 7 October, there were reports of supply depots moving forward, increased Royal Air Force activity, and extremely active patrolling along the southern sector. This prompted *General der Kavallerie* Stumme to tell his corps and division commanders that the offensive would begin soon with its main axis probably somewhere between the Ruweisat Ridge and Himeimat. *General der Kavallerie* Stumme also anticipated an advance on either side of the coastal road, and possibly an amphibious landing behind the *panzerarmee*, most likely near the key choke point at Sollum and Halfaya Pass near the Egyptian/Libyan border. Meanwhile, the army continued to fortify their positions as much as supplies would allow. By 15 October, his expectations had narrowed to 'either side of Munassib,' 'near Ruweisat,' and 'at and south of the coast road.' The next day, the *panzerarmee* informed the command groups of their subordinate corps and divisions that the *panzerarmee*'s latest intelligence assessment expected the 8<sup>th</sup> Army to attack between 20 and 25 October. On 20 October, *General der Kavallerie* Stumme informed his subordinates that an attack might come at any time and at any point. The indications were that the main effort would be concentrated against the 'northern part of our southern sector.'<sup>39</sup> "Pessimistic" reports from the front to Rome and Berlin resulted in the leadership of the *panzerarmee* being labeled "defeatist." To counter this "defeatist" view, the *Oberkommando des Heere* dispatched a senior intelligence officer, *Oberst* Liss from the "Foreign Armies West Section of the General Staff" to calm the fears of the senior leaders of the *panzerarmee*. On 20 October, this rare visitor from Berlin arrived at the headquarters of the *panzerarmee* and presented the position of Berlin that a major offensive by the 8<sup>th</sup> Army was not imminent. *Oberstleutnant* Westphal

<sup>i</sup> The 15<sup>th</sup> Panzer Division situation maps also show a battery of what appears to be 15 cm guns (probably from the 104<sup>th</sup> ARKO or possibly the Italian Corps Artillery) deployed just behind the II Battalion, 382<sup>nd</sup> Grenadier Regiment, apparently in a counter-battery roll.



sent the visitor forward to the 164<sup>th</sup> *Leicht Afrika* Division to visit his friend *Generalmajor* Lungerhausen, a regimental comrade of *Obersleutnant* Westphal.

In mid October, Captain Giacomo Guiglia, the head of the *panzerarmee*'s Italian radio intercept unit, had watched his men play soccer against the sappers of Colonel Sillavengo's XXXI Combat Engineer Battalion, eight kilometers behind the lines near Gibril Hamis. At the game, there was a large crowd, and the officers had nervously watched the sky for the Royal Air Force. However, unlike previous days of intense Allied air activity, not a single Allied aircraft appeared in the cloudless sky. Captain Guiglia believed this was the 'calm before the storm.' On succeeding days, he noticed other things that concerned him. There was a decrease in the 8<sup>th</sup> Army's radio traffic, though they had not yet reached that state of 'silence' which indicated an imminent attack. In addition, he had the impression that there was a lot of movement going on in the southern sector between Qaret el Homar and Somaket el Gaballa. However, the radio traffic in that area seemed to be little more than padding, as if the 8<sup>th</sup> Army just wanted to make a bit of noise. A great many of these transmissions were nothing more than 'X 279,' a brevity code which simply meant, 'I'll call you back.' Captain Guiglia was an exceptional man who had often guessed the contents of a coded message long before it had been deciphered. On 22 October, he could stand it no longer. That morning's aerial reconnaissance had revealed a decrease in Allied transport movements. On previous days the figures had been more than 12,000 vehicles, counting ground transport and armor together. Moreover, the temperature had fallen sharply following some recent rain showers, and this greatly improved the weather conditions in favor of the attacker. At this point, Captain Guiglia set out by car for the front, fearing that the various commands might have been lulled into a false sense of security by the general calm. Soon, he had traversed the entire front, visiting colonels and generals, both Italian and German. He felt that the latter were the most reluctant to accept that an attack might be imminent. Among the Axis soldiers and leaders, there seemed to be an air of relaxation, even laziness. To every senior officer he met Captain Guiglia warned: '*Mark my words - it's a question of hours, not days!*'<sup>40</sup>

## 6.2. TO THE LINE OF DEPARTURE (Mid October to Dusk, Friday, 23 October)

### 6.2.1. 2<sup>nd</sup> NEW ZEALAND DIVISION DEPLOYS

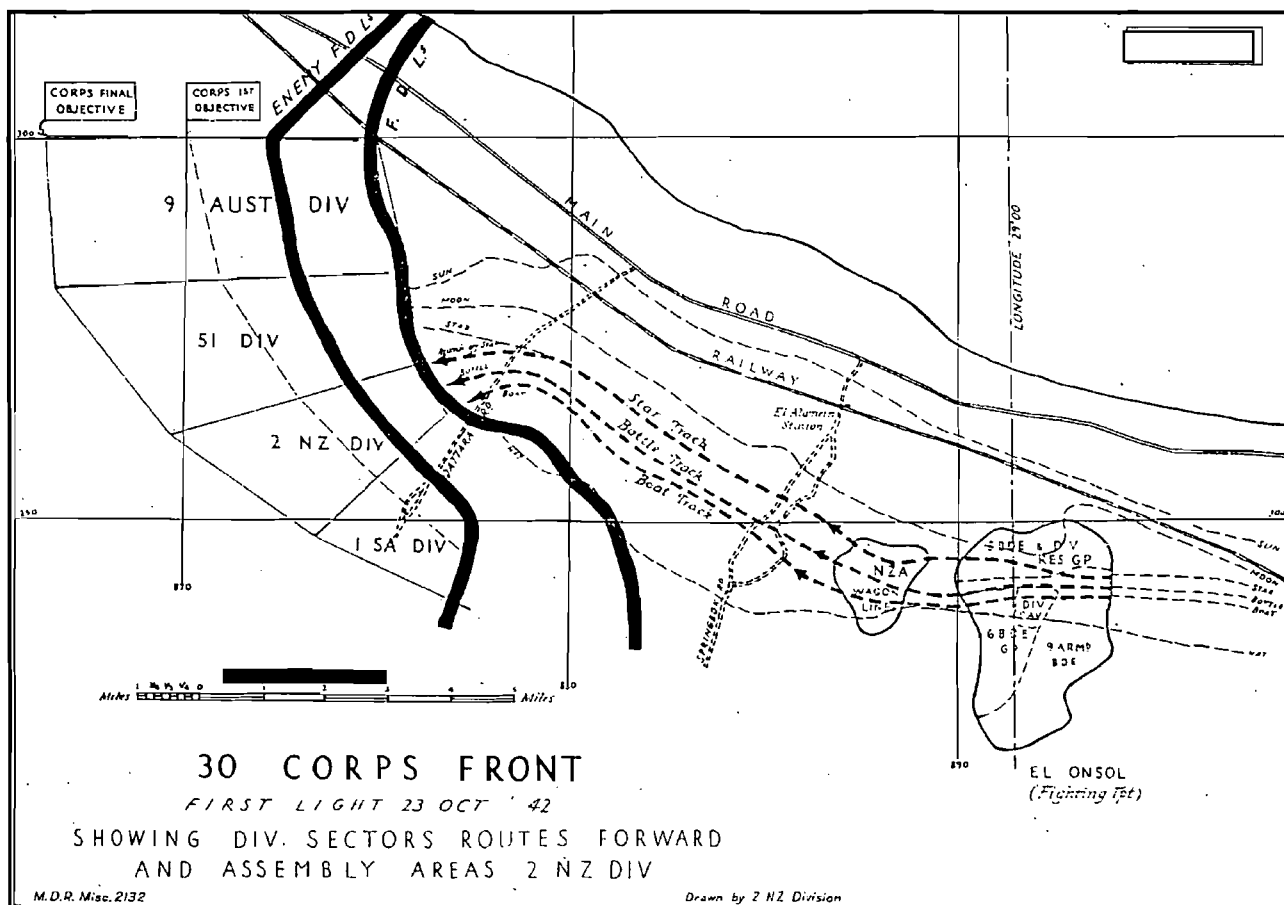
In support of the breaching operations, the 2<sup>nd</sup> New Zealand Division was assigned two troops of three Scorpions from the 1<sup>st</sup> Army Tank Brigade (including one troop on 'loan' from the 10<sup>th</sup> Armoured Division, see Photo 67). At the final division conference, Brigadier Gentry, commander of the 6<sup>th</sup> Brigade, remarked that even if the attack went as smoothly as an exercise, it was virtually impossible for the sappers to breach the minefields in the time available.<sup>41</sup> General Freyberg was also concerned about what was being asked of his sappers and, because of this, stated "*The tanks won't go through.*" General Gatehouse, commander of the following 10<sup>th</sup> Armoured Division, also thought that it was impossible for the sappers to clear mines to such a depth in a single night. Indeed, the time between Zero Hour and dawn left only a half-hour margin of error beyond the bare minimum of time theoretically required to breach the four to six kilometer long lanes.<sup>42</sup> However, Lieutenant-Colonel Fred Hanson, assured both Brigadier Kippenberger and Brigadier Gentry that his sappers would not be far behind their infantry.<sup>43</sup>

Throughout the month of October, Lieutenant-Colonel Hanson's sappers continued their preparations for Operation Lightfoot. On 12 October, twenty sappers, under Lieutenant Somerville, were sent to the area near the El Alamein railroad station to build shelters for the division headquarters and bury communications lines from there to prevent damage by Axis artillery and their own tanks. The next day, another twenty sappers under Lieutenant Pickmere, joined the Divisional Reserve Group on a classified mission. Up to this point, word of the new Scorpion mine clearing flail tanks had been suppressed and the new 'minefield busters' were kept hidden behind walls of Hessian (camouflage netting). The new device did not inspire much confidence in the mechanically minded sappers for the radiator and flail engine faced backwards, which they knew would give the engine a very short running time before it overheated. The Scorpions were brought forward one night and camouflaged as a pile of boxes under tarpaulins.<sup>44</sup> One troop was then placed under the command of each brigade. They were to be used only if the sappers could not get the Axis minefields breached in time.<sup>45</sup>

Another detachment, this one of five sappers commanded by Sergeant J. F. Smith, was attached to the Divisional Cavalry for Operation Lightfoot. They were responsible for dealing with any mines encountered by the cavalry and for any hasty demolition of captured tanks and guns that was required. The rest of the 5<sup>th</sup> Field Park Company, under the command of Lieutenant Jones, would form the logistics base for the divisional sappers and,

using other units' surplus vehicles, took part in decoys maneuvers intended to deceive the Axis into believing that an outflanking move to the south was underway. The men of the 5<sup>th</sup> Field Park Company helped drive the assembled vehicles over the desert, creating clouds of dust while the drivers and their passengers undoubtedly grumbled about being jerked around, as usual.<sup>46</sup>

Finally, a few days before the battle, the commanders were given the authority and instructions to brief the 8<sup>th</sup> Army's plan to their officers and men, with only a few reservations.<sup>47</sup> In the late afternoon of 21 October, the 2<sup>nd</sup> New Zealand Division finally began their move forward from their training area to an assembly area near Alam el Onsol, about twenty kilometers behind their start line.<sup>48</sup> This move took less than three hours and gave the impression that the whole desert for thirty kilometers back was alive, as one formation slipped into an area vacated by the one ahead. Each move was done unobtrusively in the dark. By sunrise, all tanks and artillery pieces were fitted with "sunshades," canopies painted to represent trucks. Everything possible had been done to prevent Axis air reconnaissance from spotting such a large body of tanks—even large wooden rakes were provided for tank crews to obliterate their track marks across the sand. In addition, the desert had been dotted with dummy vehicles for many miles around. Many eventually became camouflage for ammunition dumps. Though the soldiers were not supposed to know, they probably were taking up positions previously occupied by real or dummy trucks, so that, to Axis reconnaissance aircraft, the scene on the ground never appeared to change.<sup>49</sup> The assembly area of the 10<sup>th</sup> Armoured Division, which was to follow the New Zealanders through the breach, had been very skillfully laid out in a herring bone pattern.<sup>50</sup>



MAP 10. 8<sup>th</sup> Army Routes

On 21 October, the 8<sup>th</sup> Army notified its subordinate commands that D-Day was set for 23 October. For the move from the assembly area to the line of departure, the Royal Engineers of XXX Corps had built and marked eleven parallel tracks along the axis of advance.<sup>1</sup> These were named 'Diamond,' 'Boomerang,' 'Two Bar,' 'Square,' 'Sun,' 'Moon,' 'Star,' 'Bottle,' 'Ink,' 'Boat,' and 'Hat' (Map 10). These could all be recognized at night by a line of petrol tins on stakes, with the appropriate sign cut out from the rear side and lit by lamps from within. These routes would have to accommodate four infantry and two armored division amounting to an estimated 100,000 men and 15,000-20,000 vehicles.<sup>51</sup> To keep these tracks passable for the heavy traffic expected, the engineers began putting down a layer of gravel on 21 October.<sup>52</sup> Of these tracks, the New Zealanders were allotted the use of three, 'Star,' 'Bottle,' and 'Boat' to move an estimated 2,800 vehicles and 16,000 men to their assembly areas.<sup>53</sup> Although the various headquarters staffs had meticulously synchronized the whole advance, it would still prove to be a slow trip forward with many hold-ups over the whole twenty-five kilometers.<sup>54</sup>

Prior to the attack, the tracks had been completed most of the way through the 8<sup>th</sup> Army's minefields toward the line of departure. Although the thousands of acres of "friendly" minefields in the forward areas were marked clearly enough by day, they remained a deadly trap for the unwary by night. In the interest of security, the gaps through the remaining forward Allied minefields were not made by the engineers until the last possible moment and then, only with the greatest care so as not to leave any traces for prying Axis patrols.<sup>55</sup> For example, the Royal Engineers of the 275<sup>th</sup> Field Company was tasked with clearing lanes through the British minefield which crossed routes 'Sun,' 'Moon,' and 'Star' for the 1<sup>st</sup> Armoured Division.<sup>56</sup> At the same time, Major Reid's 8<sup>th</sup> Field Company was tasked with clearing two 40-yard (37-meter) wide lanes through the British minefield, about 300 meters apart for the 6<sup>th</sup> Brigade at the western end of Bottle Track.<sup>57</sup>

On 22 October, General Freyberg visited his Divisional Cavalry Regiment and issued a further operations directive giving a definite axis of advance and definite bounds to clear. The squadrons of the cavalry were now expected to finish up north of Deir el Abyad, about six or eight kilometers southwest of Miteiriya Ridge. They were instructed not to become involved in an armored battle but to concentrate on causing destruction and confusion. If the regiment with its 29 Stuart light tanks was confronted with heavy armor, it was to retire behind Brigadier Currie's 9<sup>th</sup> Armoured Brigade, whom heavier Shermans and Grants would take care of it with their 75-mm guns.<sup>58</sup> That afternoon, all ranks were assembled to hear General Montgomery's pre-battle message; the pending operation was explained in general and the part they were to play was described in great detail.<sup>59</sup> At last, everything was nearly ready. Everyone knew the general plan. Throughout the day, the final preparations continued, even though the date of the attack was still not known by the troops. Ammunition, extra rations, sandbags and grenades had to be issued. In the 26<sup>th</sup> Infantry Battalion, three Bangalore torpedoes for blowing gaps in the expected barbed wire entanglements as well as flares and signaling rockets were issued to each company. Now, it was up to the soldiers and their junior leaders. As General Montgomery observed, there comes a time where the battle is out of the hands of the generals and all depends on the soldiers.<sup>60</sup> After dusk, the 6<sup>th</sup> New Zealand Brigade set out on a sixteen-kilometer march to its forward assembly area. It was a long, dusty march, made even more trying by the continual traffic that stirred up swirling clouds of thick, yellow dust. What was more irritating to the men picked to lead the assault was the sight of infantry from other units riding in the backs of these trucks.<sup>61</sup>

By midnight on 22 October, Lieutenant-Colonel Fountaine's 26<sup>th</sup> Infantry Battalion had reached its next assembly area, about 1000 meters behind their start line, and dug its new slit trenches. By now, the New Zealanders were very confident and sensed that the attack would not be long delayed. Having studied maps and reports, all knew what they had to do. They were also aware of the difficulties they might encounter, but they had also seen the tremendous reserves that were behind them. The sight of hundreds of artillery pieces, squadrons of tanks, and the almost constant roar of Allied planes passing overhead during the move to their assembly area had given a big boost to morale. The stage was set for the attack and the players were ready.<sup>62</sup>

During Friday 23 October, Major Reid notes, "*A final check was made on all gear and personnel, and the sappers were encouraged to rest as much as possible all day. We contacted our three Scorpions and made arrangements for a rendezvous that night.*"<sup>63</sup> The troops had to lay hidden in their slit trenches, covered over with groundsheet to prevent detection by Axis aircraft. It was a trying ordeal, but most were tired after the long night

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<sup>1</sup> Four additional tracks had to be added to the initial six after the 9<sup>th</sup> Australian Division had the opportunity to refine their requirements through their planning process. The four additional tracks were called 'Diamond,' 'Boomerang,' 'Two Bar,' and 'Square.'



march and, seeing what lay ahead, knew that it was only wise to conserve their energy.<sup>64</sup> However, it seemed that the air battle had already been won for no Axis planes appeared. Late in the afternoon, the battalion commanders attended a final conference at the 6<sup>th</sup> Brigade Headquarters; they returned with the news that the attack would begin that night at 2140. Like a well-oiled machine, all units went ahead with their final preparations and soon all was ready. Zero Hour was close and the men were pleased that the waiting period was almost over.<sup>65</sup>

Major Murray Reid, Commander of the 8<sup>th</sup> Field Company described the final preparations of his sappers. *"When we arrived in the forward area the sections went straight to their respective start points. We had two gaps to put through each of two minefields, and two sections had been detailed to each line of gaps. To increase the speed of operations the second section was to leapfrog ahead to the second minefield, whilst the first section completed its work. The gaps in our own field were soon completed, by the sappers erecting the fences and hanging the lamps ready for lighting as soon as the advance commenced. Our trucks were formed up, with a screen of sappers ready to proceed ahead of the vehicles on foot. These sappers were to move fifty yards ahead of the pilot vehicle, behind which traveled our equipment trucks, using their eyes and bayonets to locate any mines and prove the ground covered to be safe for the following transport. This formation was kept until a minefield was found, when our adaptation of the mine Clearing School's drill came into play. (Section 5.4.2)*

*Some small parties of sappers were attached to each battalion to assist the attacking infantry in dealing with any mines or booby traps found and to give any other sapper assistance which might be required.*

*When the preliminary work in our own minefield had been completed, there was nothing to do but to sit down and wait for the guns to start. This short wait was one of the worst periods of the whole night. There we were, nervously moving round and talking in low tones. No smoking was allowed, so one could not even light a cigarette to pass the time."*<sup>66</sup>

Immediately after dusk, there was activity everywhere. The infantry were finally able to get out of their cramped slit trenches and make their final preparations. The cooks brought forward the last meals for many of them. The tracks forward were lit for most of their length with their distinctive signs, while the vehicles were moved up in an orderly sequence. Exactly to the minute, the hundred first-line vehicles and antitank guns of the brigade arrived and were parked close to the headquarters.<sup>1</sup> About 2100, in brilliant moonlight, the infantry moved through the two gaps in the Allied minefields made by the 7<sup>th</sup> Field Company on the evening of 21 October at the end of Bottle Track,<sup>67</sup> and started to fall in by platoons. Soon, they were advancing smoothly to the line of departure, over the gently sloping, rocky ground that was sparsely covered with scrub. The line of departure had been carefully surveyed on the featureless desert and marked, as usual, by white engineer tape.<sup>68</sup> On their left, Lieutenant-Colonel S. E. V. Quin's Capetown Highlanders (2<sup>nd</sup> South African Brigade, 1<sup>st</sup> South African Division) had formed up at about the same time and contacted the New Zealanders on the start line. The Capetown Highlanders, with 35 officers and 370 men, were arrayed with two companies up and one back.<sup>69</sup> Promptly at 2130, Lieutenant-Colonel Gwilliam's 24<sup>th</sup> Infantry Battalion stepped off from the start line, 10 minutes before the guns opened fire.<sup>70</sup>

Just before the beginning of the attack, the two infantry brigade commanders, brigadiers Kippenberger and Gentry, had sited their headquarters within a few hundred meters of one another on the line of departure. They had recently been issued Armoured Command Vehicles (A. C. V.s). These were huge, clumsy affairs, but the A.C.V. would soon prove to be an excellent mobile command post from which to direct a battle.<sup>71</sup> Except for those headquarters men scrambling around trying to complete last-minute tasks, everyone around the headquarters was standing or lying about in the moonlight waiting for the guns to open fire. Knowing that this attack might well prove to be the turning point in the battle for North Africa, all ranks were keyed up and excited. The old hands knew this was no ordinary attack. The silence was almost oppressive, as the last minutes ticked slowly past.<sup>72</sup>

#### **6.2.2. INITIAL SUPPORT, ALLIED DESERT AIR FORCE**

During the day of 23 October, Allied fighter patrols were continuously kept over the Axis forward fighter bases. They were expected to prevent hostile reconnaissance or interdiction of the 8<sup>th</sup> Army's assembly areas. That night, the Royal Air Force planned to provide additional weight to the artillery's firepower with 48 Wellington medium bombers, some scheduled to fly two sorties during the night, dropping flares and 125 tons of bombs on known Axis gun positions. Royal Navy Albacores were to be used as pathfinders for the Wellingtons. In addition, some specially equipped Wellingtons were to fly radio-jamming missions<sup>73</sup> and, to add to the confusion, four

<sup>i</sup> Infantry Brigadier, pages 225-226, presumably, similar actions were taken in the 6<sup>th</sup> Brigade zone.

Hudson bombers were to drop a number of self-destructing dummy parachutists and illumination flares deep in the *panzerarmee*'s rear in the vicinity of Fuka.<sup>74</sup>

### 6.2.3. XXX CORPS ARTILLERY PLAN

General Leese's XXX Corps planned to employ many of its guns in a World War I style barrage, meaning that a number of guns would fire on set lines and increase their range at predetermined times. For the 11.5 kilometers between Bir el Atash and Bir Abu Sifi (the zone of attack for the four assaulting divisions of XXX Corps), the corps had concentrated 336 25-pounders (plus 72 more in support from X Corps) and 48 medium guns. This total of 456 guns, under the direction of the XXX Corps' Chief of Royal Artillery, Brigadier M. E. Dennis, was opposed by an estimated 200 field, 40 medium and 14 heavy guns on the Axis side. In weight of fire, the Allied superiority in artillery in the corps sector was estimated to be between 10 to 1 and 22 to 1 (see also section 5.3).<sup>75</sup> This superiority was even more pronounced when the initial confusion and indecision of the Axis staffs, aggravated by their acute ammunition shortage, are considered.<sup>76</sup>

### 6.2.4. 2<sup>nd</sup> NEW ZEALAND DIVISION ARTILLERY PLAN

The distance from the line of departure to the 2<sup>nd</sup> New Zealand Division's final objectives, on the far side of Miteiriya Ridge, was between 4500 and 6200 meters from its start-line with the 5<sup>th</sup> Brigade on the right having a little farther to go. In support of their attack, the 2<sup>nd</sup> New Zealand Division had 104 guns. Of these, 96 were 25-pounder gun-howitzers (including 24 on temporary loan from the 10<sup>th</sup> Armoured Division), while eight were 4.5-inch guns (one battery from the 69<sup>th</sup> Medium Artillery Regiment of the XXX Corps Artillery, see Appendix J for a detailed breakout). Initially, it was planned that all of these guns would fire on a frontage of 2700 meters, slowly expanding to 5100 meters at the final objective (Phase Line Oxalic). This meant that there was only enough artillery to give each gun an initial frontage of 22 meters, increasing to 42 meters on the final objective.

General Bernard Freyberg, the division commander, felt that this was far too thin as a barrage to be worth much, for a "true" barrage was expected to saturate every meter of ground with shells to be effective. Accordingly, he directed that the New Zealanders' artillery plan be changed to include timed concentrations on "known" or "suspected" Axis positions. However, Brigadier Gentry, the Commander of the 6<sup>th</sup> New Zealand Brigade, doubted that the "known" Axis locations were accurate. For this reason, he insisted on retaining a barrage, which would sweep impartially over all the ground that his men had to cross. Moreover, he thought this would be helpful by stirring up a lot of dust and obscuring the opposition's view. As a result of these considerations, the New Zealanders' final artillery plan was a compromise which included Brigadier Gentry's lifting barrage and a rather complicated set of timed concentrations on "known" or "suspected" Axis positions in the zone of attack as desired by General Freyberg.

This final artillery fire support plan included a lifting barrage fired by the 4<sup>th</sup> Field Regiment (with about a fourth of the available guns). The advance rate of this lifting artillery barrage was set at 100 yards (91 meters) per 3 minutes. The 4<sup>th</sup> Field Regiment divided its barrage line into five sections, covered by A, D, F, B, and E Troops in that order.<sup>77</sup> This much-thinned creeping barrage was intended to help to keep the infantry "on the proper line of advance" and help maintain the momentum of the attack. In the final fire support plan, the rest of the division artillery was tasked with firing concentrations on particular spots where the Axis was known or suspected to have defenses. The 5<sup>th</sup> Field Regiment was tasked to fire on preplanned targets in the 5<sup>th</sup> Brigade's zone while the 6<sup>th</sup> Field Regiment did the same for the 6<sup>th</sup> Brigade. The artillery of the 51<sup>st</sup> Highland Division and the 9<sup>th</sup> Australian Division to the northwest, as well as the 1<sup>st</sup> South African Division to the south would be able to reinforce the fires of the 2<sup>nd</sup> New Zealand Division, if necessary, during the final stage. However, the New Zealand gunners, in turn, had to be ready to reciprocate and the inexperienced Highlanders were more likely to need help than the veteran New Zealand infantry. Other than the planned move of the 4<sup>th</sup> Field Regiment forward on the morning of 24 October to support any exploitation by the 9<sup>th</sup> Armoured Brigade, none of the New Zealanders' divisional artillery was to displace without approval from division until all Axis counterattacks had been repulsed. Throughout the attack, the battery of 4.5-inch guns, plus the twenty-five 25-pounders from the 10<sup>th</sup> Armoured Division, would continue to fire counter-battery missions.

During the seizure of the intermediate objectives along Phase Line Red, there was to be a one-hour and fifty-minute pause in the lifting barrage, just beyond each brigade's first objective. At this point, the infantry

expected the barrage to continue on the same line while the follow-on infantry battalions performed a forward passage of lines, put out engineer tape on their start lines, and formed up under the direction of their leaders. However, this was not, in fact, what the 4<sup>th</sup> Field Regiment was planning to do, as they would actually be engaging other targets at this point. After the pause, the lifting barrage was to be resumed, at the same pace, to the division's final objectives along Phase Line Oxalic.<sup>1</sup> Initially, the New Zealand gunners were opposed by only 24 artillery pieces (12 German 10.5cm howitzers and 12 Italian 75/27 guns). Operations overlays were prepared and issued, showing the position of all of the sub-units on the start lines and their positions on the objectives, with a line joining the two indicating the distance and bearing. The overlay also showed the timing of the lifting barrage and its pauses (Map 11).

With two brigades of the New Zealanders attacking abreast, and the 51<sup>st</sup> Highland Division on the right and the 1<sup>st</sup> South African Division on the left, effective marking of inter-unit boundaries was critical to maintaining orientation and preventing fratricide during the night attack across the flat division sector. General Freyberg's Aide-de-Camp, Captain J. C. White, suggested the use of Bofors anti-aircraft guns firing tracer along the inter-brigade boundary while 25-pounders firing armor-piercing-tracer marked the divisional boundaries (although not as effective as the Bofors). The 25-pounders also fired smoke shells to mark the limits of the final, rather nondescript objectives. This seemed to work reasonably well during the rehearsals.<sup>78</sup> As a result, C Troop 4<sup>th</sup> Field Regiment was tasked to fire single smoke rounds every three minutes on the brigade and divisional boundaries to help the attacking infantry maintain direction and to guide detachments following up behind them. At the same time, a section of E Troop of the 4<sup>th</sup> Light Anti-Aircraft Regiment was tasked to fire one tracer round per gun per minute to mark the same boundaries from the start line to the first objective. The 4<sup>th</sup> Field Regiment was also to fire smoke briefly on the opening line of the barrage and on the first objective as a general indication to the infantry.<sup>79</sup>

This artillery fire support plan for the 2<sup>nd</sup> New Zealand Division required a huge expenditure of ammunition. This was made possible by the work of the divisional ammunition company earlier in the month. In four nights, 72 trucks dumped 48,384 rounds of 25-pounder ammunition for the 96 field guns and on the fifth night, they dumped another 160 rounds per gun for the 72 New Zealand field guns (another 11,520 rounds) and 8,000 rounds of Bofors ammunition as well. A total of 111,744 rounds were available for all of the divisional field guns, of which 1,384 rounds (17%) were smoke.<sup>80</sup>

#### 6.2.5. ROYAL ENGINEERS, 10<sup>th</sup> ARMoured DIVISION PLANS AND PREPARATIONS<sup>81</sup>

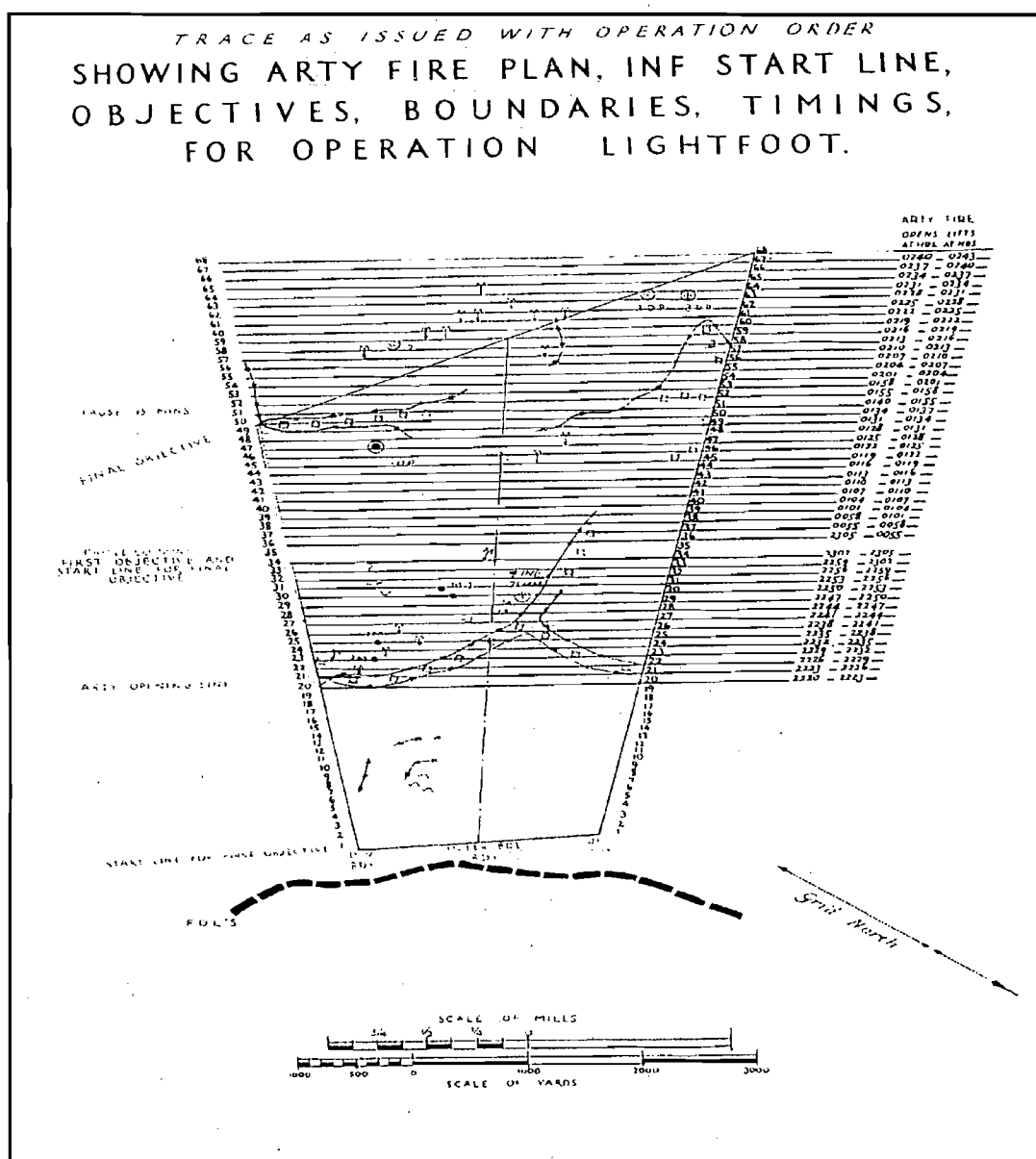
In order to preserve secrecy, the sappers were only allowed a minimum of vehicles to carry lane marking supplies and tools. Each of the two army field companies was allotted only one jeep and two trucks; one of the latter was to be used as a pilot vehicle. Major Moore's 3<sup>rd</sup> Field Squadron, which had to breach two lanes (on 'Boat' and 'Ink'), was allotted five vehicles for their support. Major Moore stated that, *"We had very few vehicle with us, I think five vehicles in all including three scout cars. We were very dependant on them for moving heavy stores. We used scout cars not because we expected to fight the enemy from them, but because their engines and transmission were invulnerable to shell splinters and stray bullets."*<sup>82</sup> In addition to the vehicles with his breach forces, Lieutenant-Colonel McMeekan planned to have a car, a courier jeep, and a radio-equipped armored car with his forward headquarters. Although radio silence would be in effect for the 10<sup>th</sup> Armoured Division, the Chief of Royal Engineers was authorized to break it in case of an emergency.

By the end of the third week of October, the 8<sup>th</sup> Army's preparations had reached their conclusion.<sup>83</sup> Finally, on the night of 22 October, Lieutenant-Colonel McMeekan's sappers moved forward to their assembly areas in preparation for the attack with Major Moore's sappers assembled in the area of the 2<sup>nd</sup> Battalion, Seaforth Highlanders Regiment (152<sup>nd</sup> Infantry Brigade, 51<sup>st</sup> Highland Division). On the eve of the attack, Lieutenant-Colonel McMeekan *"felt that every possible preparation had been made. Some of our equipment—detectors and armoured trucks for the exploiting squadron—had only arrived three days before. But we had almost everything we needed—men, tools, transport—and this feeling of being adequately equipped for the task is very rare in war."*<sup>84</sup>

<sup>1</sup> However, the 25-pounders of the 2<sup>nd</sup> New Zealand Division could not range the counterattack units of *Kampfgruppe Sud* (elements of 15<sup>th</sup> Panzer and 133<sup>rd</sup> *Littorio* divisions) dug in along El Wishka Ridge without first displacing forward. 2<sup>nd</sup> New Zealand Divisional Artillery, page 377-383.



Lieutenant-Colonel McMeekan described the movement into sector, "On the morning of the 23<sup>rd</sup> we trickled forward the fifteen miles to our forming-up place in groups of three or four lorries at a time; the vehicles then went back empty... By about 1700 hrs., we were assembled near a solitary telephone pole on the Qattara track, south of the railway, about four miles west of Alamein Station. The New Zealand infantry had filtered up like us, and their vehicles had gone back. Troops were thick on the ground, and before sunset everyone took the opportunity to cook a hot meal. It was an unforgettable scene. Thousands of little groups each gathered round their petrol tin fire, some men taking their boots off, some writing home, some sleeping. In spite of this enormous and dense concentration of 30,000 men or more in an area of perhaps three square miles, the enemy never spotted us. There was a quiet hum of conversation, but no shells, no bombs, no lorries even."<sup>85</sup> Nearby, at the railroad station at El Alamein, Brigadier Kisch and two of his staff officers had climbed the water tower to observe the artillery fire.<sup>86</sup> On 23 October, General Montgomery issued his order of the day. In it, he told his soldiers, "The battle which is about to begin will be one of the decisive battles of history. It will be the turning point of the war."<sup>87</sup>



MAP 11. Plan of the Artillery Barrage for the New Zealand Sector on 23/24 October 1942

## 6.2.6. HEADQUARTERS, 164<sup>th</sup> LEICHT AFRIKA DIVISION

In the early morning hours of a warm and sunny Friday 23 October, Axis ground and air reconnaissance reported hostile troop concentrations between Tel el Eisa and the Ruweisat Ridge as well as in the area east of Himeimat. It appeared that attack was imminent, but since *General der Kavallerie* Stumme expected the attack in the south, he refused the artillery permission to fire on the crowded Allied assembly areas.<sup>88</sup> Early that evening, while *General der Kavallerie* Stumme radioed Berlin “*Situation Unchanged*,” *Generalmajor* Karl Lungerhausen, commander of the 164<sup>th</sup> *Leicht Afrika* Division, sat drinking and talking with his staff officers in the division headquarters bunker near Tel el Aqqaqir. *Oberstleutnant* Markert (the division Ia, operations officer, equivalent to a G-3) observed that, “*Tomorrow (24 October) is a full moon*” and was about to add that “*Monty does not appear to be ready; this would be the most favorable time for an offensive*.”<sup>89</sup> However, before he had a chance to put his thoughts into words, a mighty roar like a thunderclap tore the silent, moonlit, desert night. It rumbled through the huge roofed bunker, that served as the tactical headquarters and sleeping quarters for the staff of the 164<sup>th</sup> *Leicht Afrika* Division.<sup>90</sup> While *Oberstleutnant* Markert ran up the steps of the dugout to his command truck, the Division Quartermaster (Ib, equivalent to G-4), Major Elterich, had just enough time to steady a bottle of wine as a soda water siphon rolled off the table. *Generalmajor* Lungerhausen looked through the slits towards the front. He saw a single golden flashing strip of fire—a barrage trained on the whole sector. “*Monty’s offensive has started*,” said the general. He looked at his wristwatch. It was 2045 hours on 23 October.<sup>91</sup>

## 6.3. ATTACK TO THE INTERMEDIATE OBJECTIVE, PHASE LINE RED (Dusk, Friday, 23 October to Midnight)

### 6.3.1. 2<sup>nd</sup> NEW ZEALAND DIVISION ARTILLERY SUPPORT TO PHASE LINE RED<sup>89</sup>

At Z Hour, 2140 on 23 October 1942, the horizon instantly filled with gun flashes as the ground shook. At that time, as if by magic, the sappers’ lights appeared in the lanes through the Allied minefields, as the need for concealment passed.<sup>90</sup> Though in later days, there were many barrages more intense than that at El Alamein, nevertheless, this was the one which remained most vividly in the memory of the veterans for it came with such a shock; it seemed so revolutionary, so concentrated, and so murderous. As one historian noted, it is difficult to find a written description that does this barrage justice. The opening of the El Alamein barrage tore the air. It was a crash, with no warning, which lasted for hours. There was no crescendo in its volume as it peaked within a couple of seconds of starting, so perfect was the timing of the gunners’ watches. No camera could truly record the sight because a photograph ‘freezes’ its subject and fails to grasp the eerie color of the light (however, see photos 70 and 72). Some of this appeared in stabs, some in flashes, the far-away ones as mere flickers, and the near ones as angry flames belching out, giving an instant silhouette of a gun and its crew. The noise of the barrage, at close quarters, shocked the human system, since it was more than the senses could comprehend. It seemed to be just noise to an infinite degree. For the first fifteen minutes, the guns fired counter-battery ‘murder’ missions (as described earlier) on all known or suspected Axis artillery positions within range.<sup>91</sup>

At 2155, the guns paused, and then at 2200, the timed concentrations on known or suspected Axis defensive positions began. There was hardly any Axis artillery fire in return; in a few minutes it was clear that the 8<sup>th</sup> Army had gained tactical surprise and that the artillery of the *panzerarmee* was paralyzed or knocked out. The lifting barrage for the New Zealanders began at 2220, with the 4<sup>th</sup> Field Regiment firing from gun positions near Bir el Makh Khad. This barrage started at a slow rate on a front of 2800 meters. Before the first lift, all guns fired one round of smoke, while C Troop fired nothing but smoke throughout the operation to mark the divisional and brigade boundaries. The first series of lifts, at three-minute intervals, were of 100 yards (91 meters), with the frontage widening successively until at the 15<sup>th</sup> lift on the intermediate objective, which ended at 2305, it was over 3500

<sup>i</sup> Three days prior, on 18 October, *Oberst* Liss, the intelligence officer visiting the *panzerarmee* from the OKW, had informed them that, according to his intelligence estimate, General Montgomery could not possibly attack in October.

<sup>ii</sup> Oddly enough, despite their shared sector, the headquarters of the 164<sup>th</sup> *Leicht Afrika* Division and the 102<sup>nd</sup> *Trento* Division were not co-located. The headquarters of the 102<sup>nd</sup> *Trento* Division was located 2.8 kilometers southeast of that of the 164<sup>th</sup> *Leicht Afrika* Division.

<sup>iii</sup> German time was one hour behind British. The barrage began at 2145 British time. *Foxes of The Desert, The Story of the Afrika Korps*, page 284. Unless otherwise noted, British time will be used from here on in this document. Question 10: Was the Allies’ impression that they had achieved tactical surprise based on the Axis reaction or from intercepted and decoded Enigma transmissions?

meters long (a frontage of 219 meters per gun). At this, too, the last round was smoke. At this point, the 4<sup>th</sup> Field Regiment planned to begin firing a series of timed concentrations at a very slow rate of fire for about one hour and fifty minutes. This was directed at targets beyond the first objective and the pause was to allow the infantry to consolidate on it, before starting the advance to the final objective at 0055. In the opening phase, the boundaries between the brigades, as well as the adjacent divisions, were effectively marked by pink tracers fired periodically by the 40mm Bofors Anti-Aircraft Guns of the Right Section of E Troop of 42<sup>nd</sup> Light Anti-Aircraft Battery. The timed concentrations fired by the 5<sup>th</sup> and 6<sup>th</sup> field regiments in support of the infantry brigades followed a similar general scheme, though the guns fired for longer than three minutes on the more important target areas. They varied their rates of fire and fired more total rounds than the barrage guns of the 4<sup>th</sup> Field Regiment.



**PHOTO 70. 25-Pounder Firing its Part of the Barrage**



**PHOTO 72. 9<sup>th</sup> Lancers Regiment (1<sup>st</sup> Armoured Division) Waiting on Moon Track**



The effect of this lifting artillery barrage on *Generalfeldmarshall* Rommel's "Devil's Gardens" was reported to be unimaginable to anyone who was not present. It seemed to many of the Axis defenders as though each shell burst was followed by the explosion of the shock-sensitive Tellermine or the detonation of the aircraft bombs and the other improvised explosive charges. The "Devil's eggs," which *Oberst* Hecker's pioneers had spent months carefully emplacing suffered badly. The Devil's Gardens had been intended to inflict heavy losses on the 8<sup>th</sup> Army's attacking tanks and infantry, but now many of them had been detonated or plowed up.<sup>92</sup> In addition, the bombardment soon severed the primary means of communications between the Axis outpost companies and their higher headquarters as their field telephone wires were cut.<sup>93</sup> In addition, the shelling destroyed many of the protective walls of stones and sandbags in the main battle positions of the *panzerarmee*.

The next morning, Allied soldiers standing where the shellfire had fallen the previous night found it impossible, for thousands of meters in any direction, to put a foot on the ground without treading on steel fragments. Blue-gray with the heat of explosion, crystalline and jagged from the detonation that tore the shells into small pieces, they lay scattered over the ground. Nevertheless, the vast majority of the mines remained<sup>1</sup> and the presence of so many metal fragments undoubtedly complicated electronic mine detection that night for the sappers.

### **6.3.2. INITIAL RESPONSE OF AXIS ARTILLERY AND RESERVES OPPOSITE THE 2<sup>nd</sup> NEW ZEALAND DIVISION**

At 2210, in response to the XXX Corps' artillery bombardment, the 164<sup>th</sup> and 102<sup>nd</sup> *Trento* divisions requested fire support from *Kampfgruppe Sud* and the headquarters of the 133<sup>rd</sup> *Littorio* Armored Division against an infantry attack between mine boxes K and L. This request was finally approved at 2150, forty minutes later. At 2215, the 15<sup>th</sup> Panzer Division ordered the division's reserve (consisting of the 33<sup>rd</sup> Panzer Pioneer Battalion and the 33<sup>rd</sup> *Panzerjaeger* Battalion), under *Hauptmann* Hinrichs to prepare to move.<sup>94</sup> Elsewhere, on the coast, the 101<sup>st</sup> *Trieste* Motorized Infantry Division reported an amphibious landing northwest of Fuka. It was soon recognized as a feint by the Axis leadership and does not appear to have influenced their reactions to the Allied attack.<sup>95</sup>

### **6.3.3. 6<sup>th</sup> NEW ZEALAND BRIGADE ATTACKS IN ZONE TO PHASE LINE RED<sup>96</sup>**

Brigadier Gentry, commanding the 6<sup>th</sup> Brigade planned to take his first (intermediate) objective along Phase Line Red with Lieutenant-Colonel Gwilliam's 24<sup>th</sup> Infantry Battalion. The Maoris of C and D companies from Lieutenant-Colonel Baker's 28<sup>th</sup> Infantry Battalion were to follow the 24<sup>th</sup> Infantry Battalions and were responsible for mopping up any bypassed outposts. Behind the two companies of Maoris, came Major Murray Reid's reinforced 8<sup>th</sup> Field Company that was to breach two lanes through the minefields for the vehicles of the follow-on forces. After the first objective was taken, the two trailing infantry battalions, the 25<sup>th</sup> and 26<sup>th</sup>, were to conduct a passage of lines and resume the attack to the brigade's final objectives along Phase Line Oxalic (Miteiriya Ridge), which was equally divided between these two battalions.

**6.3.3.1. 24<sup>th</sup> INFANTRY BATTALION ZONE.** Advancing from their start line at 2130, the New Zealanders of the 24<sup>th</sup> Infantry Battalion had a feeling of excitement that intensified with the startling noise of the guns as they began their work at 2140. Never before had the men been so well briefed. Never had morale been so high. Practically every man carried a record load of ammunition. After the infantry had advanced 1,650 meters into the night, and were therefore less than 200 meters short of the opening line for the lifting barrage, they were ordered to lie down and wait for their lifting barrage to begin.<sup>97</sup>

As soon as the infantry spotted the line of bursting shells of their lifting barrage, the 24<sup>th</sup> Infantry Battalion stood up and walked closer, preparing to move forward in its wake when the barrage would begin to lift at 2223.

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<sup>1</sup> *Oberstleutnant* Westphal advanced a contrary claim that 8<sup>th</sup> Army artillery fire had neutralized the minefields in his book, *Erinnerungen* (page 174). This claim also appears in historian Paul Carrell's book, *Foxes of the Desert*, which states that "The 8<sup>th</sup> Army was strong enough to shoot corridors through the minefields with its mountains of shells. Rommel had not anticipated this." On close examination, this seems to be a significant overstatement of the effects of the barrage on the "Devil's Gardens." German experience indicates that a 100 meter long gap, 20 to 25 meters wide required about 120 21cm, 400 15cm, or 600 10.5cm high explosive rounds. The weight of the 8<sup>th</sup> Army's barrage in this sector was well short of this, firing only about 1/1000<sup>th</sup> of the amount of high explosives per unit area that the Germans believed to be necessary to breach a minefield. See *Ausbildungsvorshrift fur die Pioniere, Teil 4b, Minen und Zunder*, H. Dv. 220/4b, Berlin, 1940, pages 123-124.

The lifting barrage would then advance at a rate of 100 yards (91.4 meters) every three minutes from 2223 until 2305 (1200 meters per hour). The barrage would advance 1,280 meters in that time.<sup>98</sup> The din of the bombardment was terrific, and it seemed to the waiting troops that, surely, nothing could survive under so fearful a blasting. Such a result, however, has rarely been achieved in combat. Usually, the principal effect of such firepower is to temporarily disorganize the opposing troops and suppress them by keeping them pinned down in their trenches and away from their heavy weapons while the attackers take advantage of this effect to cover the last few hundred meters to a hostile position. While somewhat dazed by the noise and the spectacle, the New Zealanders were thrilled by this demonstration of the tremendous artillery support they were receiving. Consequently, they began the attack with the greatest confidence. Nevertheless, numerous flares were seen ominously rising from the Axis lines ahead. The barrage soon churned up large clouds of dust and smoke. Despite the full moon, visibility was seriously reduced, making contact between adjacent units a significant problem. Occasionally, the men glimpsed the pink Bofors tracers that were being fired to mark the inter-brigade and inter-divisional boundaries. Smoke shells were also fired at short intervals to mark the inter-brigade boundaries but were hard to discern amid the dust raised by the bombardment.

Behind the barrage, approximately 200 riflemen from A and B companies (on the right and left respectively) of the 24<sup>th</sup> Infantry Battalion moved forward on an initial frontage of about 1000 meters. Company C followed the two lead companies in support along the axis of advance. Major Reid of the 8<sup>th</sup> Field Company described their advance, *“As the creeping barrage commenced in earnest the first wave of attacking infantry went over. It was a great sight to see them going ahead with so much confidence and determination. They were well spread out, and with fixed bayonets glistening in the light of the guns must have created a panic among any of the enemy left to dispute their passage.”*<sup>99</sup> Soon, the Maoris from C and D companies of the 28<sup>th</sup> Infantry Battalion, temporarily attached to the 6<sup>th</sup> Brigade, moved out right behind the 24<sup>th</sup> Infantry Battalion to mop up any bypassed outposts. On their left, the Capetown Highlanders (2<sup>nd</sup> South African Brigade, 1<sup>st</sup> South African Division) did not begin their advance from the start line until 2200, in accordance with their schedule. As a result, contact was immediately lost between the New Zealanders and the South Africans.<sup>100</sup> As the infantry advanced, the 24<sup>th</sup> Infantry Battalion’s fighting vehicles moved up from Alam el Onsol and came under the direct control of the battalion headquarters.

At first, as the 24<sup>th</sup> Infantry Battalion led the advance, they were able to maintain nearly perfect order and direction. The battalion quickly reached the first Axis minefield,<sup>1</sup> which had been reinforced with a barbed-wire belt just beyond it to the west. This complex obstacle crossed the front laterally, about 1600 meters or so beyond the start line. Generally speaking, opposition was slight until the 24<sup>th</sup> Infantry Battalion reached this first Axis minefield, which was covered from behind by a series of small (squad sized) combat outposts. These were manned by the approximately 200 Rheinlanders of the 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment, which was equipped with about nine light machine guns and three heavy machine guns, and supported by their battalion’s six 8cm mortars (Table 23). As the 24<sup>th</sup> Infantry Battalion gained contact with the Rheinlanders, Axis shelling and small arms fire became increasingly intense. Some of the German grenadiers fought hard in their small, detached outposts, firing until the last moment with machine and antitank guns before attempting to withdraw. Others were caught still seeking safety in the bottoms of their slit trenches from the lifting barrage that had just preceded the New Zealanders, while others laid low and were missed by the thin line of advancing infantry. Some of these waited for the first wave of infantry to pass by them before opening fire on the following elements.<sup>101</sup> Early in the advance, before visibility had significantly deteriorated, the men were sometimes able to see the eerie round shapes of Tellermines or even the trip wires of the lethal S-mines in the bright light of the full moon.<sup>102</sup>

As this first Axis minefield was not marked on the allied side, sapper lieutenants Miller and Claridge from Major Murray Reid’s 8<sup>th</sup> Field Company went forward with the Lieutenant-Colonel Gwilliam’s infantry to mark the leading edge of the obstacle. Lieutenant Miller was responsible for the northern lane (Route ‘A’), while Lieutenant Claridge was on the southern lane (Route ‘B’) (Map 12, locationⓐ).<sup>103</sup> With a 900 meter wide corridor centered along the inter-brigade boundary allocated for the lanes to be cleared by Royal Engineers of the 10<sup>th</sup> Armoured

<sup>1</sup> The Italian XXI Corps had laid 1,000 antitank mines at a density of one mine per meter of front in this sector on 22 July, followed by another 1,500 antitank mines on the 26 July. On 27 July, the 2<sup>nd</sup> Company, 900<sup>th</sup> Pioneer Battalion emplaced 250 scattered antitank mines east of the main minefields. See US National Archives, Captured German Records Division, Series T-313, Roll 432, Frames 8,724,838; 8,724,842; 8,724,846; 8,724,847.

Division (occupying about 450 meters from the right portion of the 6<sup>th</sup> Brigade zone), the two lanes for which the 8<sup>th</sup> Field Company were responsible would have to be located in the southern portion of the brigade's zone. At the start line, the New Zealand sappers had about 490 meters of frontage to work with for their two lanes. At the first Axis minefield, these two lanes were supposed to be about 500 meters apart on an 800-meter front. This separation was supposed to be maintained on to Phase Line Oxalic, where the frontage would reach a little over 1900-meters. Major Reid described the events; *"The officers in charge of our first two sections went forward behind the first wave to locate the first enemy minefield. They carried small blue lights to mark the field and to serve as a guide to the following sappers. They had no trouble in finding this field, but while returning to the company Lieutenant G. K. Miller was seriously wounded and died two days later. The loss of this fine officer almost before we had started was a great blow to the company."*<sup>104</sup> The command of No. 2 Section then fell to the senior non-commissioned officer, Sergeant Allen.



**PHOTO 73. Mine Detector Teams Silhouetted Against the Light of the Barrage, Wait**



**PHOTO 74. Sappers Breaching the Devil's Garden, the Sapper in the Middle Appears to be Lifting a Tellermine 35**



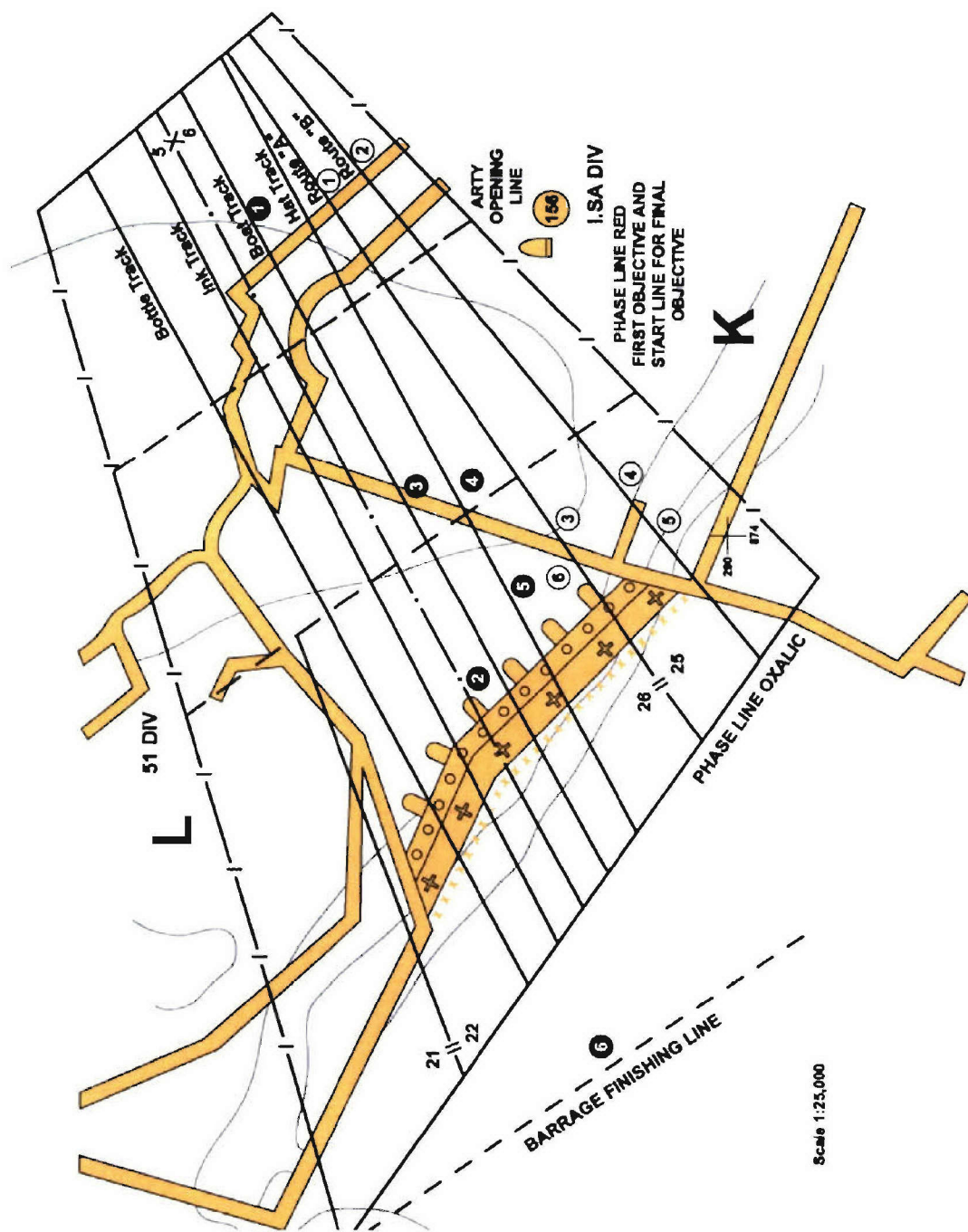
**LEGEND: MAP 12. Events in the 6<sup>th</sup> New Zealand Brigade Zone, 23/24 October**

**Royal New Zealand Engineers**

- ① Lieutenant Miller (No. 2 Section, 8<sup>th</sup> Field Company) is seriously wounded during the reconnaissance of the first Axis minefield around 2230. Major Reid's (8<sup>th</sup> Field Company) jeep strikes a mine at around 2300. Breach of the first Axis minefield began along Route A at 2300, and completed around 2330.
- ② Scorpion from the Support Group of the 25<sup>th</sup> Infantry Battalion is incapacitated by barbed wire.
- ③ No. 2 Section, 8<sup>th</sup> Field Company accidentally detonates a German improvised explosive device killing four and wounding twelve, around 2330.
- ④ The Support Group of the 25<sup>th</sup> Infantry Battalion loses one universal carrier to an unexpected minefield. This minefield was finally breached around 0500.
- ⑤ The Support Group of the 25<sup>th</sup> Infantry Battalion reaches the forward position of the 25<sup>th</sup> Infantry Battalion, around 0530.
- ⑥ The Special Group of the 26<sup>th</sup> Infantry Battalion loses three Crusaders and three universal carriers while "bulling-through" a minefield; only two 2-pounders and three mortar carriers make it through to the 26<sup>th</sup> Infantry Battalion. Although two Scorpions broke down during the breach of this minefield, the New Zealand sappers completed this lane, by about 0500.

**Royal Engineers, 10<sup>th</sup> Armoured Division**

- ① Pilot vehicle on Boat Track is immobilized by a randomly laid mine at about 2300. The breaches of the first Axis minefield, on Boat Track and Ink Track, are completed at about 0100.
- ② The breaches of the second Axis minefield, on the Boat and Ink Tracks, are begun at about 0200 and finished around 0600. The Sherwood Rangers Regiment loses about three tanks to German antitank fire attempting to deploy from the breach.
- ③ The Daimler armored car from the 3<sup>rd</sup> Field Squadron is immobilized by randomly laid mine between the first and second Axis minefield, at about 0200.
- ④ The pilot vehicle of the 571<sup>st</sup> Army Field Company struck a mine on the Hat Track.
- ⑤ Lieutenant-Colonel McMeeken, the 10<sup>th</sup> Armoured Division's Chief of Royal Engineers, abandons Hat Track, at 0430.
- ⑥ The Sherwood Rangers Regiment loses nine-teen tanks to antitank gun fire and withdraw back to Phase-Line, Oxalic.



MAP 12. Events in the 6<sup>th</sup> New Zealand Brigade Zone, 23/24 October (include legend)

**6.3.3.2. COMPANY A, 24<sup>th</sup> INFANTRY BATTALION ZONE.** On the right of the 6<sup>th</sup> Brigade zone, Company A, 24<sup>th</sup> Infantry Battalion, under Captain Aked, suffered casualties early in the attack when Lance-Sergeant Marshall was wounded. However, he carried on, taking command of No. 7 Platoon when its commander, Second-Lieutenant Butler was hit. Having led his men through the first Axis minefield, Lance-Sergeant Marshall was wounded a second time, and was eventually found sitting on the ground but still covering a small party of German prisoners in spite of his exhaustion and wounds. He was awarded the DCM (Distinguished Conduct Medal) for his persistence. Nevertheless, Company A, 24<sup>th</sup> Infantry Battalion, soon reached its objective on Phase Line Red with no great loss or difficulty. Then, it advanced another 200 meters beyond to destroy a troublesome German outpost (probably manned by the Rheinlanders of the 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment). On their right, A Company, 23<sup>rd</sup> Infantry Battalion (of the 5<sup>th</sup> Brigade) had inadvertently advanced well beyond their objective and stopped on the opening line for the next phase of the artillery's lifting barrage. A runner was sent to them. After some discussions between Captain Aked and Second Lieutenant Cooper, the only remaining officer with A Company, 23<sup>rd</sup> Infantry Battalion, Second Lieutenant Cooper, decided to withdraw his depleted company and link into the 24<sup>th</sup> Infantry Battalion.<sup>105</sup> To Captain Aked's left, B Company, 24<sup>th</sup> Infantry Battalion had some trouble maintaining their direction of march and was drifting into A Company, 24<sup>th</sup> Infantry Battalion's zone (see Section 6.3.3.3. below).

Captain Aked's A Company, 24<sup>th</sup> Infantry Battalion was followed by the Maoris of Captain W. M. Awarau's C Company, 28<sup>th</sup> Infantry Battalion. The Maoris encountered some light shelling during their advance, but had no losses as far as the first objective. Although they had gotten off to a good start, C Company, 28<sup>th</sup> Infantry Battalion soon lost touch with B Company, 28<sup>th</sup> Infantry Battalion on the left of the adjacent 5<sup>th</sup> Brigade to the north. As an indication of how thinly manned the Axis outpost line was in this area, C Company, 28<sup>th</sup> Infantry Battalion took only four prisoners in their uneventful follow-up behind A Company, 24<sup>th</sup> Infantry Battalion.<sup>106</sup>

Behind the left flank of Captain Aked's advancing infantry, Sergeant Allen's sappers (photos 73 and 74) of No. 2 Section, 8<sup>th</sup> Field Company prepared to move out and clear Route 'A,' in the northern half of the 6<sup>th</sup> Brigade's zone. To assist in the detection of the Axis minefields, the sappers on Route 'A' were led by one of Major Reid's two pilot machines (a sandbagged truck driven in reverse and pushing a set of improvised mine rollers, see Sketch 12). These sappers were to be followed by the headquarters of the 8<sup>th</sup> Field Company, which was accompanied by a detachment of divisional signals troops. These signals troops were responsible for running a field telephone line forward, and had a radio set rigged up in a Bren carrier, in case of mishaps.<sup>107</sup> Sergeant Allen's sappers were responsible for opening Route 'A' through the first Axis minefield to the first objective (Phase Line Red) on the other side.<sup>108</sup> However, despite the best efforts of the 24<sup>th</sup> Infantry Battalion and the Maoris of C Company, 28<sup>th</sup> Infantry Battalion, some German outposts were missed in the darkness and confusion of the night attack. These remained to harass the follow-on units, the first of which was Major Reid's sappers.<sup>109</sup> Major Reid described the advance of these sappers as follows, *"Half an hour later after the first wave left the Maoris went over as the 'mopping up' battalion, their role being to deal with any opposition missed by the first wave. As the Maoris went forward our trucks moved off, and the sappers joined in the battle. Behind our vehicles came the Divisional Provo, with their standards and lights. They erected a light, shining to the rear only, every 200 yards along the centre of the line traversed by our trucks. Although two waves of infantry were ahead of us all opposition had not been accounted for, and three or four times the advance sappers had to lie down to evade machine gun fire, as we could not risk too many casualties. Some of the trucks were hit by bullets, but no harm was done.*

*My position, traveling by jeep, was just in the rear of the trucks on the northern lane. Approximately half an hour after the start (about 2300) I had occasion to go forward to the head of the line. I drove to the pilot vehicle and then walked, telling my driver to follow on as we moved ahead. There were a few shells bursting here and there, and two particularly bad machine guns were firing in our general direction. All this time our shells were screaming over and bursting well ahead as the creeping barrage moved on at the rate of 100 yards every two and three-quarter minutes. As we moved forward there was a big explosion near the pilot vehicle, and I went back to see if the "shell" had damaged it. When I neared the truck I saw my jeep lying at an unusual angle, with the driver standing alongside looking at it in a dazed manner.*

*"What's the matter?" I yelled.*

*He turned round with a blank look and said: "I'm blown if I know, sir. Something bloody well went 'Bang.'"*

*I thought his answer was very amusing, seeing he was fortunate to be alive, let alone uninjured, as the jeep had struck a mine with the right front wheel. The jeep was definitely out of action, being minus one front wheel and*



*spring and with a badly twisted axle and broken engine. We swiftly transferred our gear to another truck, but, having no spare trucks, I had to spend the rest of the night on my feet.*

*At first it appeared that the jeep had struck an isolated mine, but on searching the area thoroughly we found it was part of the first minefield. The field was not marked on our side, but there was a single coil of dannert (concertina) wire on the far side. The sappers wasted no time in starting to clear a gap. At last here was a real job. Orders were not necessary. Every man had been training for weeks for just this moment.*"<sup>110</sup>

**6.3.3.3. COMPANY B, 24<sup>th</sup> INFANTRY BATTALION ZONE.** On the 24<sup>th</sup> Infantry Battalion's left flank, the South Africans, as expected, were trailing behind. This exposed Captain Conolly's B Company to enfilading fire from the, as yet unengaged, Sicilians of the 11<sup>th</sup> Company, III Battalion, 61<sup>st</sup> Infantry Regiment. These Sicilians had an estimated 110 men equipped with six light machine guns and two heavy machine guns (Table 23). Consequently, these New Zealanders unconsciously edged away to the right (north) and crowded in to Captain Aked's A Company as it moved toward the first objectives along Phase Line Red. Company C, coming up in support, also drifted some distance to the right leaving Lieutenant-Colonel Gwilliam's battalion headquarters to advance with no infantry ahead of it. After observing this drift for a time on his compass, and confirming the result by reference to the intelligence section's compass man to his front, Regimental Sergeant-Major (RSM) Cohen informed Lieutenant-Colonel Gwilliam, the commander, who had also noticed this tendency. The 40mm Bofors' tracers fired along the 6<sup>th</sup> Brigade's left boundary was, at this time, passing by just to the left of the battalion headquarters, confirming the commander's assessment about who was off course. Sergeant-Major Cohen commented, "*This (loss of direction) most probably was produced by a combination of the lay out of the enemy's wire and defenses and the lack of contact on the left which exposed our left flank to harassing fire and at the same time left it floating and unanchored.*" The sergeant-major asked the battalion commander whether he should instruct the intelligence section guides to stick to the compass bearing or tell them to follow C Company, who were now drifting to the right across the front of the battalion headquarters. That is, whether to carry out the original instructions, even though this would disrupt the battalion formation, or to return to station in the battalion formation and risk reaching Phase Line Red with the whole battalion seriously out of position. Lieutenant-Colonel Gwilliam decided to stick to the compass and sent a runner to C Company to direct them to return to their correct position. Thus, the battalion headquarters continued to move on the line laid down in the original orders, in spite of a general drift to the right by B and C companies, which became more marked as the attack progressed. Consequently, the battalion headquarters gradually shifted from its position in the center rear of the battalion's formation and became instead the left flank. This exposed the headquarters to harassing fire from the Italian positions in front of the South Africans, who had not advanced as far as the New Zealanders, and with whom the 24<sup>th</sup> Infantry Battalion did not expect to regain contact until the following morning.

The Maoris of Captain Logan's D Company, 28<sup>th</sup> Infantry Battalion, on the left of the 6<sup>th</sup> Brigade zone, were not as lucky as the men of their sister unit, C Company, 28<sup>th</sup> Infantry Battalion. Although the first few hundred meters of their advance was unopposed, they soon came under fire from an Axis artillery battery, which had escaped the heavy Allied counter-battery fire. As this battery began firing on the area they were moving through, additional casualties were caused by some bounding S-mines, a type that had not previously been encountered by the Maoris. Their understandable desire to push on, as rapidly as possible, out of this dangerous area was frustrated by the fact that B Company, 24<sup>th</sup> Infantry Battalion ahead of them would move only as fast as the barrage in front of it. By the end of their ordeal, this company had sustained somewhat less than 20 casualties.<sup>111</sup> Behind the Maoris, the sappers of No. 2 Section, 6<sup>th</sup> Field Company (attached to the 8<sup>th</sup> Field Company) under Lieutenant Claridge were pushing the southern breach, along Route 'B' toward the first objective, along Phase Line Red.<sup>112</sup>

Nearing the first objective along Phase Line Red, the left flank of C Company, 24<sup>th</sup> Infantry Battalion, which had been assigned to support the lead companies, ran into opposition when its No. 13 Platoon encountered a machine gun nest. This nest was eventually neutralized by three salvos from D Company, 28<sup>th</sup> Battalion's 2-inch (50mm) mortars that forced the Germans to abandon their position. Seeing the German grenadiers running from their outpost, the Maoris closed in. Three prisoners and seven machine guns were captured, of about twelve machine guns with the 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment on outpost duty (Table 23). One prisoner, wearing a stretcher-bearer's armband and carrying a Luger pistol, was shot on the spot. The others, who had left earlier were lucky, for though they passed close to No. 14 Platoon, C Company, 24<sup>th</sup> Infantry Battalion, the survivors were mistaken for Maoris in the gloom and allowed to escape unmolested into the night. At about the same time,

No. 14 Platoon engaged the crew of an antitank gun, who then joined the machine gunners in their hasty retreat.<sup>i</sup> Sergeant-Major Cohen, who had come forward to see how the advance was going, was wounded during this action. Next, the commander of No. 14 Platoon, Lieutenant Ramsay, went to the right with two of his men to determine the location of the leading companies. He stated that, *"We found A and B concentrated together, B at that time hotly denying they were off their course. Realizing suddenly that the whole of the left flank of the Battalion was open, I sent the runner back to advise Captain Yeoman and to let my sergeant, Alan Wetherill, know the position. Due to the fog-like smoke, the general confusion of the battlefield, and the shifting of Captain Yeoman's Headquarters, the runner got lost. After a delay Corporal Wishart and I set out but had a like fate and did not succeed in contacting Captain Yeoman until about 0200 hrs."*

**6.3.3.4. 24<sup>th</sup> INFANTRY BATTALION CONSOLIDATES ALONG PHASE LINE RED.** At the location where Lieutenant-Colonel Gwilliam's 24<sup>th</sup> Infantry Battalion consolidated along Phase Line Red, the 6<sup>th</sup> Brigade's zone was approximately 1,000 meters wide. Although this intermediate objective had been seized within a few minutes of the planned time, 2305 hours (Z plus one hour and 25 minutes), reports from Lieutenant-Colonel Gwilliam of the 24<sup>th</sup> Infantry Battalion's success did not reach Brigadier Gentry's brigade headquarters back at the line of departure for some time. Nevertheless, the 6<sup>th</sup> Brigade was able to assemble a general picture of the situation from reports passed back by various support units, such as the engineers, signals, and the battalion support group.<sup>113</sup> While attempting to consolidate on the first objective, Lieutenant-Colonel Gwilliam found that his two lead companies were still slightly off their line-of-march. Moreover, both had exploited forward of their objective. It would take some time before the battalion headquarters could sort out the confusion and get their units deployed to their correct positions.<sup>114</sup>

Just behind the infantry, the sappers were working hard to keep up. When Lieutenant Hanger, of No. 1 Section, 8<sup>th</sup> Field Company arrived at the first Axis minefield, he found that Lieutenant Claridge's southern lane, on Route 'B,' was not quite ready and directed his section to lend a hand to get the waiting tanks and vehicles forward. Soon, P. W. Briant, in the lead Bren gun Carrier of Lieutenant-Colonel Bonifant's 25<sup>th</sup> Infantry Battalion's support group, to which the Scorpion was attached arrived on the scene, which he described as follows, *"It must have been getting on to midnight when we were given the OK to lead off. About a mile after the start line we came across a minefield, so the Scorpion was sent ahead. After the dust had settled we followed through the gap and found that the Scorpion's flail was badly tangled with barbed wire. The crew said that they would have to clear it, so we went on without them."*<sup>115</sup> Lieutenant Hanger also described the incident, *"Somewhere about here Major Murray Reid and Lieutenant Ralph Pickmere turned up with some flail tanks which proceeded to get stuck in our gap. Much cursing, and telling God all about it as we then had to set to and clear a new gap to get around the damned things (Map 12, location 2)."*<sup>ii</sup>

During these breaching operations, the sappers quickly found that with the Scorpion's flail attachment working there was absolutely no visibility forwards—just a column of thick dust and stones. Elsewhere in the division zone, one sapper lieutenant had to resort to the expedient of standing in the open hatch of the tank and sighting backwards to navigate. When operating, the new device seemed to work reasonably well, though it did occasionally miss mines or throw them into the air, some of which landed unexploded on the Scorpion itself.<sup>116</sup>

After the sappers had completed Route 'B' through the first Axis minefield (in front of the 6<sup>th</sup> Brigade's intermediate objective), it had been planned that No. 1 Section, 8<sup>th</sup> Field Company under Lieutenant Hanger would leapfrog forward of Lieutenant Claridge's section. They would then follow Lieutenant-Colonel Bonifant's 25<sup>th</sup> Infantry Battalion, which was to continue the attack to the division's final objective on Phase Line Oxalic. A similar change was planned on the northern lane, Route 'A,' where No. 3 section, under Lieutenant Andrew, would relieve No. 2 Section (now under Sergeant Allen) and continue the lane behind Lieutenant-Colonel Fountaine's 26<sup>th</sup> Infantry Battalion to the final objective.<sup>117</sup>

<sup>i</sup> One source (Alam Halfa and Alamein, page 267) indicates that this action may have taken place in the South African zone of attack.

<sup>ii</sup> Only New Zealand Engineers, Middle East, pages 354-355 and War in the Desert, The Eighth Army at El Alamein, pages 172-173 mentions the presence of Major Reid or flails on this lane. Neither Alam Halfa and Alamein, page 273, nor Major Reid's own book, The Turning Point, With the N. Z. Engineers at El Alamein, pages 190-191 mentions this incident. In fact, Major Reid's account seems to imply that he spent the entire night on Route 'A.'



Major Reid described the work by Sergeant Allen's sappers required to complete the breach through the first Axis minefield on Route 'A,' *"The tapes were run out and the centre detector party away within a few minutes. To expedite the work instructions were issued just prior to the start of the attack that gaps would be only 16 yards wide for a start, the widening to the full forty yards being done as the opportunity arose. Within half an hour (about 2330) we were through the field and carrying on to the next.*

*The mines, found in this first field were a mixture the majority being G. S. Mk. V, our own mines. No enemy-made mines were found at all. During the Eighth Army's retreat, the Germans had captured many thousands of our mines in Tobruk and Mersa Matruh, and used them liberally in their own protective minefields. So it was one of our "own mines" that ruined my jeep after all! Perhaps it was just as well for my driver, as had he hit the more powerful Teller mine he must have been killed instantly.*

*There was a group of burnt out trucks close to this gap. The enemy appeared to have them accurately placed, for machine gun bullets were constantly hitting them, and sometimes bouncing off in fiery curves. If the enemy gunners had only switched their fire about 100 yards to the right we would never have got through that field without serious casualties. The vicinity of these trucks was "lousy" with mines. The Germans, knowing our propensities for souvenirs and salvage, invariably mined places like this, and we soon learned never to approach them in a vehicle."*<sup>118</sup>

Major Reid continues his description, *"We had cleared the first gap (on Route 'A') so quickly that I did not send the second section through, but left them at this gap to widen it out to forty yards. We continued on our bearing, examining the sand along the route for any signs of mines. The air was thick with dust and smoke, and we were close behind the hursting shells when suddenly a figure loomed out of the haze.*

*"Are you the Engineers?" asked the figure, who was wounded, with his clothes in tatters.*

*"Yes. Who are you?"*

*"Capetown highlanders, sir. Can you get on to your guns? They're dropping short, and have nearly cleaned all of us up."*

*"You must be well out of position. The South Africans are nearly 1,000 yards to the south."*

*"I don't know about that. All I know is 25-pounders are bursting amongst us, and we have lost over half the company."*

*"Where is your company?"*

*"Straight ahead, sir."*

*"You get on back and I'll see what can be done."*

*It appeared that his company had swung too far to the north and become mixed up with our barrage. A little further on we found the remnants of his company, with the few fit men left attending to the numerous wounded. I managed to get a message back to Brigade about these casualties, and they agreed to send for an ambulance.*

*"We made no stop in our advance while dealing with the South Africans, and shortly afterwards I found that we, too, were getting too close to our barrage, so called a halt till it advanced again. We were almost on the first objective, which was shelled for thirty minutes, before the barrage lifted and crept on to the second objective. As the sergeant turned to halt the section an enormous explosion took place about forty yards away. I felt myself hurled to the ground, and rolled over and over. By the time I had picked myself up and gathered my wits the sergeant was dead. I was of the opinion that it must have been a huge shell, but thought it strange that no sound of its whistle had been heard. From the language coming from the rear I guessed more casualties had occurred, and on reaching the section I was horrified to find fifteen, three more being dead and twelve seriously wounded (Map 12, location ⑨). Sixteen men out of thirty-six were gone in one blow. It was terrible. Brigade Signals had a telephone cable-laying jeep with my trucks. A telephone was connected up, and within a minute or two I was talking to the brigadier.*

*"He confirmed my thoughts that I was almost on the first objective; but where were the infantry? We had not seen a sign of them. Arrangements were made to evacuate the wounded, and the second section hurried forward to take over the work. As the barrage lifted about twenty shells fell short and right among our vehicles. To be shot up by the enemy was quite a fair risk of war, but we did resent our own guns "having a go, too." I complained to the brigadier in no uncertain language, as more shells dropped short. He seemed to think I was mistaken, but one could always tell from which direction the shells were coming.*

*"The telephone was resting on the sand at the rear of the jeep and I had walked no more than a dozen yards when a 25-pounder shell landed directly under the jeep, which disappeared for a second or two in the dust and smoke, and then, lo and behold, what a jeep! The four sides were still in position, but that was all. The whole of the inside had been blown out and the engine turned end up on the front axle. The driver, who was sitting in it at*



the time, was picked up some yards away unconscious, but still alive. There did not appear to be a wound on his body and his pulse was as good as ever. He had a remarkable escape from sudden death.

*"A Bren carrier which carried a wireless set for my use in case telephonic communication was cut was standing twenty yards away, and the operator of the set was wounded in the neck by the same shell. We had great difficulty in stopping the bleeding and wanted to send him straight back. However, he had very strong views on this matter, and would not leave his set until a relief arrived. This lad stuck to it for nearly two hours before being relieved; he fainted twice and was violently ill, but nothing could get him out of that carrier. His relaying of messages was invaluable to the Brigadier, and I was very pleased at a later stage to see his name figuring in an honours list for an immediate award of a well-earned decoration.*

*"The disaster blow to No. 2 Section affected all ranks, and the survivors were sent to the rear to form a reserve in case of more casualties. It was afterwards that the cause of the giant explosion was a huge booby trap, a description of which will be found further on."<sup>119</sup>*

The attack to Phase Line Red had cost the 24<sup>th</sup> Infantry Battalion 8 killed and 72 wounded. In addition, their supporting forces had also suffered casualties. The Maoris of D Company, 28<sup>th</sup> Infantry Battalion had suffered somewhat less than 20 casualties while the sappers of the 8<sup>th</sup> Field Company had suffered proportionately the greatest losses in the brigade so far, with 5 killed and 12 wounded. In exchange, within the 24<sup>th</sup> Infantry Battalion's zone, at least ten Germans and three Italians had been captured with at least another two Germans killed during the attack to Phase Line Red. In addition, at least eight German machine guns (at least one of which was a heavy machine gun) and one German antitank gun had been captured or knocked out in the same period. As stated earlier, the New Zealanders' intelligence (maps 7 and 11) had shown approximately sixteen antitank guns, four 75mm light infantry guns, two or three mortars, and thirty machine guns. Denied essential artillery support by *General der Kavallerie* Stumme's decision to withhold his artillery fire, the 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment (which had begun the battle with about 200 men equipped with only three heavy machine guns and nine light machine guns) had failed to accomplish their mission. Although they had identified the main attack in their area, they had not significantly delayed the advance of their opponents across the minefields. Indeed, faced with overwhelming odds, they had lost at least three-quarters of their machine guns and withdrawn into the night as best they could (contrary to *Generalfeldmarshall* Rommel's orders (Annex 1, Appendix A)).

#### 6.3.4. PROGRESS OF ADJACENT UNITS

**6.3.4.1. NEW ZEALAND 23<sup>rd</sup> INFANTRY BATTALION.** To the north of the 6<sup>th</sup> New Zealand Brigade, Lieutenant-Colonel Romans' 23<sup>rd</sup> Infantry Battalion, with its three rifle companies abreast and one in reserve, had also stepped off of its line of departure at 2130 and waited for the lifting barrage to start forward at 2223. As they approached the line of combat outposts, they came under fire from the "Spandaus," and small arms of two or three outposts that were forward of the first Axis minefield; these were manned by a mix of Germans and Italians (apparently from the German 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment and the Italian 7<sup>th</sup> Company, II Battalion, 62<sup>nd</sup> Infantry Regiment). At about the same time, mortar and artillery shells began landing amid the New Zealanders. Casualties mounted rapidly. As the 23<sup>rd</sup> Infantry Battalion approached the first Axis minefield, their left-hand company was in contact with the 24<sup>th</sup> Infantry Battalion, but had lost touch with the rest of the 23<sup>rd</sup> Infantry Battalion. This company then encountered solid opposition from what was estimated to be a company strongpoint in and behind the first minefield. As stated earlier, after neutralizing the Axis outpost, this company unintentionally advanced beyond their objective along Phase Line Red. After a runner from the 24<sup>th</sup> Infantry Battalion informed them that they had halted on the opening line for the second phase of the lifting barrage, they withdrew. However, the rest of the battalion, as a result of a navigation error, also overshot their objective and, in fact, soon reached the foot of Miteiriya Ridge. Later in the morning, they redeployed to their proper objective. They had captured about 50 prisoners, mostly Italians, at a cost of 33 killed, 143 wounded, and 1 missing. As a result of effective Axis artillery and mortar fire (not the resistance of the Axis infantry), this battalion suffered the highest casualties in the 2<sup>nd</sup> New Zealand Division.<sup>120</sup>

**6.3.4.2. SOUTH AFRICAN CAPETOWN HIGHLANDERS REGIMENT.** To the south of the 6<sup>th</sup> New Zealand Brigade, the two lead companies of the Capetown Highlanders Regiment had crossed their line of departure at 2200; thirty minutes after the 24<sup>th</sup> New Zealand Infantry Battalion had crossed theirs. Ten minutes later, the trailing company of the Capetown Highlanders Regiment crossed the line of departure. Almost immediately, the lead companies came under heavy fire, apparently from the combat outposts manned by the Sicilians in the 11<sup>th</sup> Company, III Battalion, 61<sup>st</sup> Infantry Regiment. This company had about two heavy machine guns and six light

machine guns. The battalion mortars of the Capetown Highlanders were also heavily shelled. Within twenty minutes, the most northern platoon had lost five killed. Nevertheless, by 2240, the company on the right had taken its first objective. The other lead company over ran its own artillery fire. At about the same time, their commander was wounded as they entered the first Axis minefield. This company was able to continue its advance once the artillery fire lifted. At 2256, the trail company reported that New Zealanders were moving across the divisional boundary. By 2317, the right-hand company was through the 'mine marsh.' By 2330, they and the other lead company had advanced about 450 meters beyond their intermediate objective without meeting any Axis infantry. At 2350, the right-hand company reported that they were being delayed and were out of contact with the New Zealanders. At 2353, the left-hand company reported that they were pinned down by machine gun fire from the next objective, had taken heavy casualties, and were requesting mortar fire. Shortly afterward, they reported that they had taken their objective. Around midnight, the Capetown Highlanders regained contact with the 24<sup>th</sup> New Zealand Infantry Battalion and prepared to continue their advance.

### 6.3.5. BRITISH 8<sup>th</sup> ARMoured BRIGADE ADVANCE TO PHASE LINE RED<sup>121</sup>

For the attack, Major Moore had assigned Boat Track to 2<sup>nd</sup> Troop (Captain Leese and Lieutenant Keighley) and 3<sup>rd</sup> Troop (Lieutenant van Grutten and Second-Lieutenant Eley) of the 3<sup>rd</sup> Field Squadron. To their north, Ink Track was the responsibility of 1<sup>st</sup> Troop (lieutenants Jimmy Hague and Bernard Jarvis) of the 3<sup>rd</sup> field Squadron and a section from the 573<sup>rd</sup> Army Field Company under Second-Lieutenant Smith. During the advance, the dismounted sappers had to carry their mine detectors, their large reels of white tape, their tin mine-markers, their pickets and lamps. As stated earlier, in support of this operation, the 3<sup>rd</sup> Field Squadron had about five vehicles in all, including three armored cars. The sappers used the Daimler Armoured Cars for carrying their heavy stores. Apparently, the other two vehicles with Major Moore's squadron were the two pilot vehicles (one each for Boat and Ink tracks). In preparation for their advance, Major Moore's sappers had assembled behind the New Zealand 24<sup>th</sup> Infantry Battalion, on the right side of the 6<sup>th</sup> Brigade zone.

As the artillery bombardment began at 2140, the British sappers were waiting in their assembly area. On schedule, the sappers of the reconnaissance parties moved out, reaching their start line at 2210. At 2220, the British sappers watched as the shells of the lifting barrage began to burst 1,500 to 2,000 meters ahead of them. Then, the New Zealand infantry rose up from the ground and moved up close to the line of bursting shells, in preparation for following the barrage as it lifted. Right behind the New Zealanders, the British sapper reconnaissance parties moved forward, stepping off on their compass bearings according to the drill. At 2225, the main body of Major Peter Moore's 3<sup>rd</sup> Field Squadron left their assembly area with Lieutenant-Colonel McMeekan, the Chief of Royal Engineers, British 10<sup>th</sup> Armoured Division, following them on Boat Track, which led along the boundary between the 5<sup>th</sup> and 6<sup>th</sup> New Zealand Brigades. Lieutenant-Colonel McMeekan was perhaps the only man to follow that barrage in a staff car as he sat on the roof "*in order to see the troops.*" He was followed by his small reserve of sappers under Major Carr, and finally, by his regimental aid post (consisting of one doctor and one orderly in an ambulance). Boat Track was also the route of the 10<sup>th</sup> Armoured Division's main axis and was designated for the tanks of the Sherwood Rangers Regiment, followed by General Alec Gatehouse's divisional headquarters.

After waiting ten minutes on their start line, the main bodies of the 3<sup>rd</sup> Field Squadron continued their advance, crossing through the breach in the last Allied minefield and into 'no-man's-land.' About 1,500 meters ahead lay the first Axis minefield, the location of which was reasonably well known. On their way along Boat Track, the 2<sup>nd</sup> and 3<sup>rd</sup> troops of the 3<sup>rd</sup> Field Squadron were lead by their sandbagged pilot vehicle, about 50 meters to their front, driven by Sapper Shaw. The breach element on Ink Track moved forward in the same fashion. The rest of their vehicles were to remain at the start line until called forward. The breaching parties of the 3<sup>rd</sup> Field Squadron walked forward to within 450 meters of the first Axis minefield and halted as the sappers waited expectantly for the blue light placed by the reconnaissance officer to appear. At the same time, the guns thundered behind them and the barrage roared ahead. Lieutenant-Colonel McMeekan found this barrage "*soothing.*" The moonlight, not yet obscured by dust, cast a pale light on an otherworldly scene in which the few score of sappers now seemed to be alone in a realm of noise. At this time, "*We felt rather lonely and naked,*" wrote Major Moore, "*without any escort of infantry or tanks.*"

Finally, the reconnaissance parties' blue lights showed ahead and the breach parties moved out, each breach element led by their pilot vehicle. Soon, machine guns from the German outpost line (7<sup>th</sup> Company, 382<sup>nd</sup> Grenadier Regiment) began to fire and their yellow tracers flickered along the line, as a few shells began to fall nearby. It was



soon clear to the British sappers that the infantry fight with the Rheinlanders for the combat outpost line was not over yet. At about 2300, Sapper Shaw's pilot vehicle struck a mine and lost a wheel (Map 12, location ❶). Major Moore described the operation. *"We soon saw that this was probably a rogue mine some yards ahead of the main minefield, a fairly common German practice.<sup>1</sup> Still, to make certain Captain Leese started our gapping drill at about the same point where the vehicle had gone up."* Just as the tape laying party and the breaching parties deployed, an Axis shell struck the pilot vehicle and it burst into flames. Immediately, nearby German machine guns and mortars turned on the flaming beacon and the now visible sappers. Particularly dangerous, a German heavy machine gun, which had been placed within the minefield, came to life very close to the sappers' left flank. Under this fire, Major Moore, Driver Shaw (unhurt by the mine) and one or two others grabbed fire extinguishers and, in about ten minutes, managed to extinguish the flames. Then, Major Moore dispatched Lieutenant John van Grutten, the leader of the sapper reconnaissance team and a young Cambridge undergraduate, to attack this machine gun nest with rifles and hand grenades. Within about fifteen minutes, Lieutenant van Grutten had silenced this machine gun by personally shooting the gunner, which caused the rest of the gun crew to run off into the night. As the reconnaissance party returned unharmed, Major Moore heaved a sigh of relief. He knew that it had been risky to use them in this manner, as they would be needed to locate and mark the next Axis minefield.

With the destruction of this machine gun nest, Major Moore's sappers were now able to get down to working in their echeloned minesweeping teams. Starting at the wrecked pilot vehicle, the sappers began sweeping with their mine detectors, feeling with their fingers for trip wires, marking and lifting the mines and finally taping the sides of the lane. After weeks of training, this was the real thing. Knowing that time was precious; they worked as fast as their delicate and dangerous task allowed. The sappers moved forward meter by meter, eyes to the ground, ears tuned to the mine detector's alarm, all the while trying to ignore the distracting sounds of battle all around and trying to remain cold-blooded in the heat of a night battle. Tellermines, Italian mines, a few S-mines and mines of other sorts were soon lifted from the soil of the Devil's Garden and disarmed. It was not difficult to find the mines at first, for the wind had blown away the sand in many places, leaving the mines clearly exposed. As the first breach on Boat Track progressed smoothly, Major Moore observed, *"The great thing about our drill was that I never had to issue an order, every member knew what to do, and could go on doing it in his sleep."* In fact, Major Moore was even able to walk north to Ink Track at this time to check on the progress of his 1<sup>st</sup> Troop under lieutenants Hague and Jarvis, reinforced by a "very business-like" section of the 573<sup>rd</sup> Army Field Company, under Second-Lieutenant Smith. He found that everything was also proceeding well on Ink Track at this point.

While the sappers had been stopped for those fifteen minutes, as the nearby German machine gun nest was eliminated, Lieutenant-Colonel McMeekan, waiting to the rear of the 3<sup>rd</sup> Field Squadron, became restive and walked forward to find out what the delay was. However, before he reached the front, the sappers had moved forward again and begun their breach of the first Axis minefield. Nevertheless, he was growing concerned, as he looked at his watch. It was now 2320. Twenty minutes late and time was already one of their most precious resources. Moving his armored car up, he sent dismounted runners out laterally along the near side edge of the first Axis minefield for news of the other routes ('Hat' to the left, 'Ink' and 'Bottle' to the right). This was necessary because, as Major Moore observed, *"Movement in no-man's-land at night in a vehicle positively invited being blown up on a stray mine, and vehicles were therefore kept to the marked routes which went from back to front. Nearly all sideways movement had to be done on foot."*<sup>122</sup> Soon, signals personnel of the Minefield Task Force arrived to lay a field telephone line, but the increased shelling soon cut the wire. Radio communications were little better at this time. Throughout the night, in fact, communications would remain Lieutenant-Colonel McMeekan's main problem. As stated earlier, the field squadrons only had two or three man-pack radios, called Radio Set 18. These were heavy, short-ranged and very unreliable. The sappers were also equipped with one vehicle mounted unit, Radio Set 19, in the squadron headquarters, but this set was too vulnerable to take too far forward.

Also, at about this time, Major Moore's sappers captured their first three prisoners. These men were Italian (probably from the 7<sup>th</sup> Company, II Battalion, 62<sup>nd</sup> Infantry Regiment) and were badly shaken by the artillery barrage. Lieutenant-Colonel McMeekan soon found that they were *"guarded by three sappers, looking very fierce with bayonets. I could not afford sappers for this sort of thing, so the escort was reduced by two-thirds."*

While breaching this first Axis minefield, Major Moore reported an eerie experience, *"Suddenly long lines of men in line abreast appeared behind us with rifles at high port and their bayonets shining in the moon light."*

<sup>1</sup> Apparently one of those 250 antitank mines scattered by the 2<sup>nd</sup> Company of Major Kuba's 900<sup>th</sup> Pioneer Battalion on 27 July 1942.



*Their faces seemed blackened and they spoke to one another in an unintelligible tongue. They were in fact a Maorie Rifle Company of the 6<sup>th</sup> New Zealand Brigade (almost certainly C Company, 28<sup>th</sup> Infantry Battalion), and they swept through us without incident from any anti-personnel mines.”*

Nevertheless, by this time, it was Major Moore’s turn to worry. A detachment of military policemen, belonging to Lieutenant-Colonel McMeekan’s Minefield Task Force should have come forward in lorries by this time with a load of pickets to mark the route forward across “no-man’s land” between the Allied and Axis minefields, but there was still no sign of them. He looked at his watch. Time was critical. Finally, out of the dusty moonlight, he saw a small figure walking slowly towards him. As the figure came nearer, Major Moore saw that he was staggering under an enormous load of pickets. By the broad red band around the man’s helmet, he knew that he was a provost corporal. Major Moore spoke sharply to him: “*Good God, what are you doing here? Where’s your lorry?*”

The little corporal answered without concern, “*Sorry to be late, Sir. Afraid the Lorries got shot up. A lot of casualties, Sir. So I’ve carried up as many pickets myself as I could. I’ll be right back for some more, Sir.*” In fact, both trucks belonging to the military police had been hit by shell fire about 100 meters back. All of the military policemen, including the company sergeant major, had been killed or wounded except for this lone lance corporal. Shortly thereafter, about midnight, Lieutenant-Colonel McMeekan arrived on this scene. He directed some of his reserve sappers, from Major Carr’s unit (the 141<sup>st</sup> Field Park Squadron, reinforced with a section from the 571<sup>st</sup> Army Field Company), to take over the tasks of the military police and to look after their wounded. However, the intrepid lance corporal had meanwhile gone on ahead alone. Lieutenant-Colonel McMeekan did not see him again, but Boat Track was marked and lit along its length before dawn.

The men of the Minefield Task Force quickly completed their two breaches, on Boat and Ink tracks, through the first Axis minefield. These were lit with the little orange and green lamps that marked the safe way forward. After checking the quality of the first breach, the sappers sent word back to the tankers of the Sherwood Rangers Regiment behind them that the first breach was complete.<sup>1</sup> Major Moore commented, “*This field was gapped and marked by about 1 A.M. which was pretty well up to time, three hours for 200 yards sweeping at three yards a minute.*” Then, Major Moore went forward with Sergeant-Major Booth to see how Lieutenant van Grutten and his reconnaissance party were doing at the next Axis minefield. At about the same time, just to their north on Ink Track, Lieutenant Bernard Jarvis led his reconnaissance party of a corporal, a lance corporal and three sappers forward on azimuth to the next Axis minefield.<sup>123</sup> After seeing to the last details of the breach, the main body of the squadron prepared to move forward and breach the next Axis minefield. At 0050, 1,300 meters ahead, the New Zealanders had resumed their attack to Phase Line Oxalic. It was now about 0100 and the British sappers on Boat and Ink tracks were 30-40 minutes behind schedule.

#### **6.3.6. INITIAL REPORTS TO DEUTCH-ITALIENISCHEN PANZERARMEE**

Martin Ranft, a gunner assigned to a battery of captured French 155mm howitzers (in either the II or III battalion of 2<sup>nd</sup> Afrika Artillerie Regiment, formerly the 528<sup>th</sup> or 523<sup>rd</sup> artillery battalions of the 104<sup>th</sup> ARKO), was stationed between the coast road and the Mediterranean Sea. He was looking east at 2140 when suddenly the horizon lit up. There was a delay of some six or seven seconds before the sound of the artillery reached him. He described the barrage as, “*Fantastic. Never experienced anything like it. We were on the receiving end of artillery concentrated on a half-mile square. Next morning when we looked out of our holes, all was different.*”<sup>124</sup> Jaeger Muhlberger of Generalmajor Ramcke’s Brigade of Fallschirmjaeger left the following detailed description of what it was like to be on the receiving end of the Allied barrage, “*crouching in my hole, about 60cm deep, I thought that I was getting insane. The world had turned into a deafening din of explosions, detonations, hissing and crackling. The earth quaked. All hell had broken loose over our position. Suddenly, deep within myself, something which I had when I was younger sprang up again: faith, that intangible thing which helped me through and protected me in*

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<sup>1</sup> The British sappers must have done outstanding work here, as it would appear that no mines were missed as thousands of vehicles later used the 10<sup>th</sup> Armoured Division’s tracks to get forward with out a single loss to mines in the breaches.

*the past. I knelt in my whole and prayed, begging God to see me out alive and also, to be back at home for Christmas. I also swore that, unless my wishes were granted, I would no longer believe in him.”<sup>124</sup>*

At 2335, *Oberstleutnant* Markert, the Ia (Operations Officer) of the 164<sup>th</sup> *Leicht Afrika* Division, reported to the 15<sup>th</sup> Panzer Division that they had identified two major axis of attack. One report, presumably from the 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment, indicated that there was an attack in battalion strength with armor support between mine boxes K and L. This attack was led by the New Zealand 24<sup>th</sup> Infantry Battalion, with two companies (about 200 riflemen combined) abreast initially. However, reports from the Italian 7<sup>th</sup> Company, II Battalion, 62<sup>nd</sup> Infantry Regiment, (which faced the attack of the adjacent New Zealand 23<sup>rd</sup> Infantry Battalion) did not reach the headquarters of the 164<sup>th</sup> *Leicht Afrika* Division. As a result, the true nature and scope of the attack remained unclear to the high level staffs and commanders. In fact, this “attack in battalion strength with armor support,” was the spearhead for the entire 2<sup>nd</sup> New Zealand and the British 10<sup>th</sup> Armoured divisions.

Initially, only these two companies (German 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment and the Italian 7<sup>th</sup> Company, II Battalion, 62<sup>nd</sup> Infantry Regiment) faced these two divisions. The 7<sup>th</sup> Company, II Battalion, 62<sup>nd</sup> Infantry Regiment had about 125 men equipped with only three heavy machine guns and six light machine guns. The 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment had about 200 men equipped with only three heavy machine guns and nine light machine guns. Although they had identified the main attack in their area, they had not significantly delayed the advance of their opponents across the minefields. Denied essential artillery support by *General der Kavallerie* Stumme’s decision to withhold his artillery fire, these two outpost companies had failed to accomplish their mission and indeed had been quickly overrun. In the 6<sup>th</sup> New Zealand Brigade zone, at least ten Germans and three Italians had been captured with at least another two Germans killed during the attack to Phase Line Red. In addition, at least eight German machine guns (at least one of which was a heavy machine gun) and one German antitank gun had been captured or knocked out in the same period. The 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment, faced with overwhelming odds, had lost at least three-quarters of their machine guns and withdrawn into the night as best they could. In exchange, the attack to Phase Line Red had cost the 6<sup>th</sup> New Zealand Brigade about 120 casualties, including at least 13 killed. In the 5<sup>th</sup> New Zealand Brigade zone, about fifty prisoners had been captured during the attack to Phase Line Red. Although sector of the 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment extended into the 5<sup>th</sup> New Zealand Brigade zone of attack, New Zealand reports describe the prisoners as mostly Italians. In exchange, the attack to Phase Line Red had cost the 5<sup>th</sup> New Zealand Brigade at least 177 casualties, including at least 33 killed. In both New Zealand brigades, it appears that mortar/artillery fire caused most of the casualties, rather than small arms fire from the opposing outpost companies.

Another report from 164<sup>th</sup> *Leicht Afrika* Division to the 15<sup>th</sup> Panzer Division indicated a battalion size attack between mine boxes L and J (the 9<sup>th</sup> Australian and 51<sup>st</sup> Highland divisions). This attack was also reported to have armor support. A weaker attack, by just infantry, was reported along the railroad to the north. At midnight, *Oberst* Hirsch’s 382<sup>nd</sup> Grenadier Regiment erroneously reported that the attack (by the New Zealanders) between mine boxes K and L had been forced back.<sup>125</sup>

Based on the delayed and feeble response from the *panzerarmee*, it was soon clear to XXX Corps that their attack had achieved complete tactical surprise. Indeed, as mentioned earlier, *General der Kavallerie* Stumme’s last situation report to the OKW shortly before the artillery barrage began stated: “*Enemy situation unchanged.*” Moreover, the series of simultaneous 8th Army raids over the sixty-kilometer front from the sea to the Qattara Depression, meant that *General der Kavallerie* Stumme, who believed the 8<sup>th</sup> Army would eventually make its main attack against the 27<sup>th</sup> *Brescia* Division in the Deir el Shein position just south of the center of his line, had no means of knowing which thrust he should concentrate upon. Communications with the outpost companies had been quickly disrupted, by the shelling which cut the field telephone wires<sup>126</sup> and allied jamming efforts, which degraded radio communications. As a result, it appears that the location of the Allied forces could not be determined with much accuracy. Although some incomplete reports were received by the headquarters of the *panzerarmee* from some of the German battalions (Map 13), no reliable information was received from the Italian infantry companies

<sup>1</sup> *Green Devils! German Paratroopers, 1939-1945*, page 67. Note: the author has been unable to locate any detailed eyewitness accounts from soldiers of the 164<sup>th</sup> *Leicht Afrika* or 102<sup>nd</sup> *Trento* divisions that actually endured this barrage. Therefore, this one from the Ramcke Brigade has been included in this document. Admittedly, the Ramcke Brigade was subjected only to a secondary effort and therefore the barrage they received was not as intense as the one further north. Nevertheless, it was felt that the account would be incomplete without some appreciation of what it was like to be on the receiving end of this famous barrage.

on the combat outpost line for some time. However, the Italian 101<sup>st</sup> Trieste Motorized Infantry Division did report the dummy landing northwest of Fuka, but it was quickly recognized as a feint. This dummy landing does not seem to have influenced the reaction of the German leadership.<sup>127</sup>

*General der Kavallerie* Stumme, acting commander during *Generalfeldmarshall* Rommel's absence, believed in centrally controlled artillery fire and had directed that the ammunition starved guns of the 104<sup>th</sup> ARKO would engage only known targets and were not to open fire too soon.<sup>1</sup> In the confusion, caused by the initial Allied barrage, he decided, contrary to *Generalfeldmarshall* Rommel's guidance, not to expend his limited artillery ammunition on either the vulnerable assembly areas, or breaching forces of the Allies, nor in a counter-battery dual with the lavishly supplied Allies. He decided to hold his fire until the battle for the main defensive area was joined. *Generalfeldmarshall* Rommel later wrote, "because of the meager stocks of ammunition in Africa, he (*General der Kavallerie* Stumme) did not authorize the artillery to open fire on the British assembly positions. This was a mistake, in my view, for it would have at least reduced the weight of the British attack. When the artillery did finally open fire it was unable to have anything like the effect it might have had earlier, for the British had by that time been able to install themselves in the defense posts they had captured during the night."<sup>128</sup> Although German records indicate that casualties were not very heavy and that many weapons survived the artillery 'murders',<sup>129</sup> for at least an hour, there was virtually no response from the German or Italian artillery. Then, the divisional artillery units began to respond to the initial attack and these only feebly at best. The corps and army level artillery of the *panzerarmee* remained passive. Indeed, so little counter-battery fire came back at the New Zealand field guns that the only casualty reported among the New Zealand gunners on this night was one man from the 5<sup>th</sup> Field Artillery Regiment. He had to be evacuated with bleeding ears, a disability for which the Axis could not be blamed. Indeed, the wonder was that after an ordeal of more than four hours of constant firing there were not more like him at the gun positions.<sup>130</sup>

At this point, *General der Kavallerie* Stumme also ordered that the immediate counterattacks, routinely executed by local commanders, should be postponed. He wanted to wait until daylight would allow him to make a more accurate assessment of the situation. Then, he planned to launch a series of larger, better-coordinated counterattacks.

#### **6.4. ATTACK TO THE FINAL OBJECTIVE, PHASE LINE OXALIC (Midnight to Dawn, Saturday, 24 October)**

##### **6.4.1. 2<sup>nd</sup> NEW ZEALAND DIVISION ARTILLERY SUPPORT TO PHASE LINE OXALIC**

At this point (2305 to 0055), the 2<sup>nd</sup> New Zealand Division's barrage plan (Map 11) provided to the infantry had an ambiguity that had, until now, passed unnoticed. The plan seemed to indicate that the barrage would lift 182 meters (200 yards) beyond the first objective on Phase Line Red and continue firing there, on what was the opening line for the second phase of the attack, for an hour and 50 minutes. This would have protected the two leading infantry battalions (the 23<sup>rd</sup> and 24<sup>th</sup>) of the division during consolidation. Some infantry officers expected to use the line of exploding shells to indicate the limits of the objective, thus simplifying the layout of the defense in the dark and featureless desert. However, the Chief of Royal Artillery, Colonel Weir, had actually planned for the lifting barrage of the 4<sup>th</sup> Field Regiment to cease at this point while the regiment joined in the firing of concentrations on known and suspected Axis positions between Phase Line Red and Phase Line Oxalic. These concentrations were to sweep back and forth in a pattern designed to discourage any Axis troop movements. In addition, the gun crews were to be rotated through a short rest period and their guns serviced.<sup>131</sup>

At 0050, (Z plus 170 minutes (2 hours, 50 minutes)), the 4<sup>th</sup> Field Regiment resumed its lifting barrage on the line just beyond the first objective. Once again, the lifts were 91 meters (100 yards) every three minutes, except for the 31<sup>st</sup> lift (starting at 0140), during which the guns were scheduled to fire for three minutes, pause for eight, and then fire again for three minutes on the same line, before starting the next lift. The line of this 31<sup>st</sup> lift ran along the crest of Miteiriya Ridge, halfway through the second phase of the artillery program and was intended to give the infantry a chance to catch up, before assaulting their final objective, if they had fallen behind. As the front widened and the firing churned up the dust again, the barrage evidently became hard for the infantry to follow. However,

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<sup>1</sup> Some accounts imply that this restriction applied to all of the Axis Artillery, however, the various unit records make it clear that this only applied to high level artillery of the 104<sup>th</sup> ARKO, and not the corps and divisional artillery of his subordinates



some of the infantry still found it useful, for it not only helped them maintain direction, but it suppressed the fire of the many centers of resistance outside the 'known' Axis locations. On three more lifts between the first and final objectives, the guns fired a last round of smoke, which did nothing to improve visibility. As a guide, this was much less effective than the pink Bofors tracer rounds used to mark the boundaries in the opening phase. The division's front on the final objective was about 3,900 meters according to the barrage trace. This was an extremely long frontage for the twenty 25-pounders available to the 4<sup>th</sup> Field Regiment. To make matters worse, this also coincided with the main defensive positions of the three weak Axis infantry battalions in this sector. The 4<sup>th</sup> Field Regiment's lifting barrage was supposed to last until 0222, 4 hours and 22 minutes (262 minutes) altogether, but the unit diary states that the unit went on firing until 0230. This appears to include the defensive fire tasks that covered the final objective. These were near the maximum range of the 25-pounders. The regiment also fired smoke on selected areas beyond the final objective for 28 minutes after the lifting barrage ceased.<sup>132</sup> As the guns of the 4<sup>th</sup> Field Regiment resumed their lifting barrage, the medium 4.5" guns, combined with the reinforcing 25-pounders of the 10<sup>th</sup> Armoured Division continued firing counter-battery missions.<sup>133</sup>

For the second phase of the attack, the 5<sup>th</sup> and 6<sup>th</sup> field regiments continued firing timed concentrations on known or suspected Axis positions, similar to those fired in the first phase. The preplanned tasks of the 6<sup>th</sup> Brigade's supporting 6<sup>th</sup> Field Regiment were scheduled to continue for 4 hours and 13 minutes (253 minutes), lasting until 0213 on 24 October.<sup>134</sup>

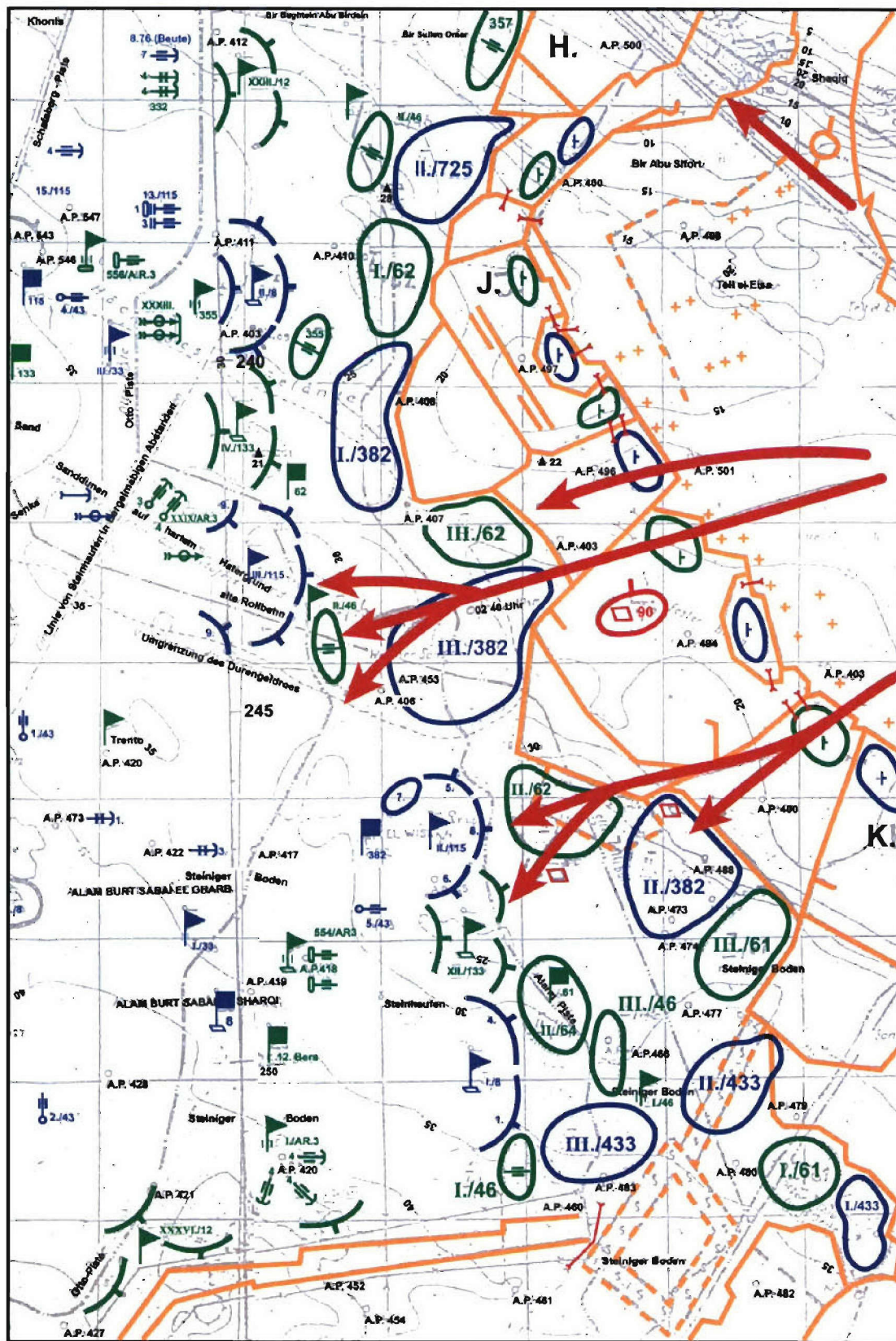
When the four Allied infantry divisions of the XXX Corps attacked to their final objectives, many soldiers hoped and believed that they would not find a single living creature. However, they were wrong. The survivors of the Axis infantry battalions and companies lay in their wretched holes among the remains of the wire entanglements and ploughed up minefields. They, German and Italian alike, prepared their remaining antitank guns and machine guns, determined to stop the Allied infantry attack against their main defensive positions.<sup>135</sup>

By the time the barrage was over, the ammunition handlers, no more than four per gun, had prepared and carried to the guns nearly seven tons (6,350 kilograms) of shells in five hours. The last rounds were followed by the diminishing whine of the shells as they sped down range, and then, an unexpectedly long period of rumbling, as the sound of their bursting came back to the guns. The noise around the guns had ceased and after that, the silence was almost painful. The New Zealander's divisional guns had each fired an average of 630 rounds, by the calculations of the staff, and there was much evidence of it, in the form of piles of expended shell casings and blistered paint on the gun barrels.<sup>136</sup>

#### **6.4.2. 6<sup>th</sup> NEW ZEALAND BRIGADE CONTINUES THEIR ATTACK IN ZONE TO PHASE LINE OXALIC**

For the attack on the division's final objective, the 5<sup>th</sup> and 6<sup>th</sup> brigades each leapfrogged two infantry battalions through their infantry battalion (and the Maoris) that had led the attack to the first objective.<sup>137</sup> During this phase, the 6<sup>th</sup> Brigade would have the 26<sup>th</sup> Infantry Battalion on the right and the 25<sup>th</sup> Infantry Battalion on the left. Due to the shortage of trained New Zealand infantrymen, each of the infantry battalions in the 6<sup>th</sup> Brigade, had only three rifle companies (as stated earlier). Once on Phase Line Oxalic, Brigadier Gentry's brigade would have to cover a frontage of about 2,100 meters, a little over one kilometer per infantry battalion. However, for the attack to Phase Line Oxalic, both the 25<sup>th</sup> and 26<sup>th</sup> infantry battalions were reinforced with a 'slice' of divisional assets. As stated earlier, this 'slice' consisted of one troop of 6-pounder antitank guns from the 7<sup>th</sup> Anti-Tank Regiment, a platoon of Vickers .303 Machine Guns from the 27<sup>th</sup> Battalion (Machine Gun), one or two Scorpion flail tanks (from the 1<sup>st</sup> Army Tank Brigade), and a troop of three Crusader tanks from A Squadron, Royal Warwickshire Yeomanry Regiment (of the 9<sup>th</sup> Armoured Brigade) under their command. These tanks were to support the infantry and assist in mopping-up any troublesome Axis positions.<sup>138</sup> In addition, each infantry battalion was supported by a small party of sappers, which was attached for handling any light combat engineering tasks the infantry needed done.

As described earlier, beyond the first objective on Phase Line Red it was planned that the sappers of No. 3 Section under Lieutenant Andrew would relieve those of Sergeant Allen's No. 2 Section, 8<sup>th</sup> Field Company on the northern lane (Route 'A') now behind the left flank of the 26<sup>th</sup> Infantry Battalion.<sup>139</sup> On the southern breach lane (Route 'B'), No. 1 Section, 8<sup>th</sup> Field Company under Lieutenant Hanger would do the same for Lieutenant Claridge's section and follow the 25<sup>th</sup> Infantry Battalion to Phase Line Oxalic.<sup>140</sup>



**MAP 13. 15<sup>th</sup> Panzer Division Situation Map as of 0400 24 October**  
(See Annex 3, Appendix E for an explanation of German military symbology)



As stated earlier, the rate of advance to the final objective was fixed at 91 meters (100 yards) per three minutes, the same as for the first phase of the advance. The final objective was 1400 meters beyond the brigade's first objective. The plan called for the capture of the final objective by 0245 (Z plus five hours and five minutes). After consolidating and reorganizing, the 25<sup>th</sup> and 26<sup>th</sup> infantry battalions were to exploit success for a further 750 to 900 meters beyond Phase Line Oxalic to destroy any Axis guns and troops likely to interfere with their new defensive positions.<sup>141</sup> As sunrise was at 0620, the sappers had only two and a half hours, from the time the infantry were expected to take their final objective and dawn, to locate and breach the final tactical minefield, believed to be just to the east of Miteiriya Ridge. These breaches would enable the infantry battalions' critical supporting arms and the tanks of the 9<sup>th</sup> Armoured Brigade to come forward, before the 10<sup>th</sup> Armoured Division conducted its forward passage of lines and continued the attack to Phase Line Pierson. Brigadiers Kippenberger and Gentry were concerned by this lack of time. Brigadier Kippenberger, commanding the 5<sup>th</sup> Brigade stated, "*We had wanted an earlier start and a shorter pause in the advance so as to have a longer period of darkness for these purposes, but the other divisions would not agree.*"<sup>142</sup>

**6.4.2.1. 24<sup>th</sup> INFANTRY BATTALION SECTOR.** The 25<sup>th</sup> and 26<sup>th</sup> infantry battalions moved up the brigade axis and prepared to cross their start lines on the 6<sup>th</sup> Brigade's intermediate objective along Phase Line Red. Around the start line, visibility was very poor, owing to dust, smoke, and darkness. In fact, according to Lieutenant-Colonel Fountaine, the commander of the 26<sup>th</sup> Infantry Battalion, visibility had decreased to about 20 meters by this time. Also, as stated earlier, the 24<sup>th</sup> Infantry Battalion's leading companies (A and B) at this time were still slightly off their planned line of advance and, moreover, had both exploited forward of Phase Line Red. The Maoris of Captain Logan's D Company, 28<sup>th</sup> Infantry Battalion were also in the area and still out in front, but soon, they were able to establish contact with C Company, 24<sup>th</sup> Infantry Battalion (on the left flank of that battalion). Consequently, both the 25<sup>th</sup> and 26<sup>th</sup> infantry battalions had great difficulty finding their start lines for the attack to Phase Line Oxalic. While they awaited the arrival of the 25<sup>th</sup> Infantry Battalion, the Maoris of D Company reorganized on the first objective in preparation for continuing their mopping up operations on the brigade's left, when the 25<sup>th</sup> Infantry Battalion assumed the attack to Phase Line Oxalic. On the right, the luck of the Maoris of C Company, 28<sup>th</sup> Infantry Battalion continued to hold as the 26<sup>th</sup> Infantry Battalion arrived on the start line, a little late, but in good condition. Captain Awarau's Maoris of C Company were to follow the 26<sup>th</sup> Infantry Battalion through to the final objective (Phase Line Oxalic), which had been laid down at the western foot of Miteiriya Ridge. So far, this company of Maoris had taken only two casualties and had captured four more prisoners.<sup>143</sup> At 0055, as the lifting barrage for the second phase of the attack resumed, the leading companies of the 24<sup>th</sup> Infantry Battalion drew back to Phase Line Red. A few of their men encountered the advancing troops of the 25<sup>th</sup> and 26<sup>th</sup> infantry battalions, but apart from this, the passage of lines was executed without establishing direct contact between the units involved. After the passage of lines was completed, the 24<sup>th</sup> Infantry Battalion was supposed to dig in along Phase Line Red.<sup>144</sup>

**6.4.2.2. 25<sup>th</sup> INFANTRY BATTALION ZONE.**<sup>145</sup> Lieutenant-Colonel Ian L. Bonifant's 25<sup>th</sup> Infantry Battalion (with only three rifle companies (B, C, and D)) had left its assembly area at 2250. To pass through the breach made by the 8<sup>th</sup> Field Company in the last Allied minefield, the 25<sup>th</sup> Infantry Battalion had to narrow its front, with C Company (Captain Wroth) leading, followed by B Company (Captain Weston) and D Company (Captain Possin). Then, the battalion moved about 1800 meters from its assembly area to the 24<sup>th</sup> Infantry Battalion's start line. From there, the 25<sup>th</sup> Infantry Battalion had to advance another 3100 meters to its start line for phase two. This start line was just beyond the brigade's first objective, along Phase Line Red. There, the 25<sup>th</sup> Infantry Battalion was due to assume the attack behind the lifting barrage which was scheduled to resume at 0055 hours. The success of this second phase of the operation required the early arrival of the battalion's support group, which had the unit's heavy weapons, on the final objective. Initially, the support group was lead by two Bren gun carriers, followed by one Scorpion mine clearing tank, three Crusader tanks from 'A' Squadron of Lieutenant-Colonel Guy Jackson's Royal Warwickshire Yeomanry Regiment, with a second group of Bren gun carriers bringing up the rear. This group was to follow the infantry and, with the aid of the Scorpion, make its own way through the minefields if necessary. The advance of the support group presented a much more difficult problem than the assault of the dismounted infantry, as at least two antitank minefields were believed to lay between the initial start line and the final objective. Each of these would have to be breached in turn, either by the sappers or by the Scorpion before the tanks and guns could make the next bound forward. As described earlier, Lieutenant Claridge's No. 2 Section, attached from the 6<sup>th</sup> Field Company, with assistance from Lieutenant Hanger's No. 1 Section, had finished the breach of the first Axis minefield in front of the brigade's intermediate objective just after midnight. At this point, Lieutenant Hanger's No. 1 Section had 'leap frogged' over No. 2 Section, 6<sup>th</sup> Field Company and was to continue



the lane behind the 25<sup>th</sup> Infantry Battalion to the final objective. However, as described earlier, the Scorpion's flail had been fouled by barbed wire while breaching the first Axis minefield, and so was out of action.<sup>146</sup>

Captain Weston stated that as B Company passed through the gap in the last Allied minefield, they were *'opening into artillery formation on the western side of the gap, moving forward with 11<sup>th</sup> Platoon on the left, 12<sup>th</sup> Platoon on right, and 10<sup>th</sup> Platoon in reserve; 12<sup>th</sup> Platoon on right was contacting C Company who were directing and they reported being unable to contact 26<sup>th</sup> Battalion who were on their right. Consequently the attack had a tendency to drift to the right.'* After passing through the last Allied minefield, the 25<sup>th</sup> Infantry Battalion was supposed to form up on the 24<sup>th</sup> Infantry Battalion's initial start line.

However, during their deployment for the advance to the 6<sup>th</sup> Brigade's intermediate objective, Lieutenant-Colonel Bonifant's men had difficulty finding the blue lights with which (according to orders) the 24<sup>th</sup> Infantry Battalion was supposed to have marked their start line. Both captains Wroth and Weston, however, had noticed a line of white tape that they agreed must have been their start line, and so, with C Company on the right, B on the left, and D in reserve, they deployed. Captain Wroth of C Company, the base unit, commented: *"It was difficult to know just where to expect to find the lights marking the line especially when we suddenly found ourselves enveloped in a heavy concentration of smoke. Right in the center of this smoke the company commander ran direct against a Battalion Provost NCO complete with light that had not been visible in the murk, the NCO being able to give explicit directions to where the other lights were placed. While the company correctly placed itself, with the 15<sup>th</sup> Platoon on the right, 13<sup>th</sup> Platoon on the left, and 14<sup>th</sup> Platoon in reserve, contact was established with the 26<sup>th</sup> Battalion on our right, and whereas a moment before everyone was worried about locations, we were all set now for the big attack."*

By 0030 hours, having reached the start line on Phase Line Red for the second phase of the attack (to Phase Line Oxalic), the 25<sup>th</sup> Infantry Battalion still did not have contact with the Capetown Highlanders of the 1<sup>st</sup> South African Division on their left. In fact, contact with the 26<sup>th</sup> Infantry Battalion on their right had also been lost by this time. Captain Weston described the attack, *"As the (B) Company approached the barrage it began to lift and we followed at about 50 yards, but so far the 24<sup>th</sup> and Maoris, whom we were supposed to pass through, had not been sighted. C Company reported that they were still unable to contact the 26<sup>th</sup> Battalion and we were unable to contact the South Africans on our left."*

Captain Weston of B Company, deployed on the left of the 25<sup>th</sup> Infantry Battalion, described some of the problems encountered during their advance to Miteiriya Ridge, *"Some ('friendly') shells were falling short causing a considerable number of casualties. Owing to the dust and smoke it was impossible to cover the front allotted to the Company and keep contact. The attack still drifted to the right as C Company endeavored to contact the 26<sup>th</sup> Battalion. Opposition from the enemy was slight. Single Dannert (concertina) wire and booby traps were encountered. The Company passed over several dug enemy positions, many of which were unoccupied and others showed signs of a hurried departure. Those of the enemy (probably Italians from the III Battalion, 61<sup>st</sup> Infantry Regiment) who were left surrendered after firing a few shots. Some were killed before having a chance to surrender. On reaching (what they thought was) the objective (on Miteiriya Ridge) at 0200 hours the company consolidated and dug in. No. 10 Platoon passed through and exploited for about 400 yds (about 360 meters) then returned and dug in on our left rear flank, D Company passed through later to exploit."*

Company D's part in the attack was described by Second-Lieutenant Buchanan, commanding No. 18 Platoon. *'For this attack D Company was given the task of Reserve Company for the Battalion and followed B and C Companies to their objectives. It was then found that the Battalion was approximately 400 yds to the right of their correct position. So D Company moved over to the left to fill this gap between the 25<sup>th</sup> Battalion and the South Africans. While in this position the Company came under intermittent fire from two enemy MG (machine gun) posts (again, probably Italians from the III Battalion, 61<sup>st</sup> Infantry Regiment) approximately 600 yds (about 560 meters) forward and one on each flank. The two forward platoons (16 and 17) were sent forward to silence these guns. As a result of this local action Second Lieutenant Dickson, 2 Sergeants, and 6 enlisted of D Company were killed, also Second Lieutenant Powdrell, 1 Sergeant, and 6 enlisted were wounded, Second Lieutenant Powdrell later dying at ADS. In the early hours of the morning the tanks of 9<sup>th</sup> Armored Brigade and of X Corps took up positions along the crest occupied by the 25<sup>th</sup> Battalion and engaged Axis positions and tanks. In this action 5 more enlisted of D Company were wounded.'*

Captain Wroth of C Company, 25<sup>th</sup> Infantry Battalion, observed that “*Brigade training a few weeks previously had proved invaluable in that the forward sections of the forward platoons knew what advancing under a barrage was and how close it was possible to keep to the rear shells, with the result everything went according to plan and but 18 casualties were suffered, mostly from enemy shelling. After 3840 paces advance we reached a wire marking a minefield which would appear from directions given prior to the attack to be the exact spot we were looking for as an objective.*<sup>1</sup> *A hurried conference with the B Company Commander who was also sure this was our objective and C Company Commander set fire to his success rocket... The company then took up a defensive layout—we had lost contact with the right neighboring battalion during the advance and a patrol sent out to locate them contacted their Battalion Headquarters approx. 600 yds (about 560 meters) on our right flank, proving their forward elements had pushed on further than us in accordance with the layout of the enemy minefield. While returning, this patrol contacted two companies of Maoris moving up into the gap between the two battalions, and they undertook to cover the gap until first light when a fuller reconnaissance would be possible.*”

In fact, due to navigational errors and confused by the presence of an unexpected third Axis minefield, Lieutenant-Colonel Bonifant’s 25<sup>th</sup> Infantry Battalion was over 700 meters short and 500 meters north of their objective. They had, in fact, stopped on the near or eastern side of Miteiriya Ridge instead of continuing the advance to the western side (their actual objective).

Following the infantry during their advance toward the final objective, Major Reid’s sappers met a group of South Africans who had suffered severe casualties, possibly from their own supporting artillery. The sappers gave them what help they could.<sup>147</sup> At around 0200, Lieutenant Hanger’s sappers received some unexpected support for their mine clearing activities from the Maoris of Captain Logan’s D Company, 28<sup>th</sup> Infantry Battalion, which, on Captain Logan’s own initiative, went forward for nearly one-and-a-half kilometers passed their objective to provide the sappers some security. When the Maoris received some fire from the South African zone (probably from elements of III Battalion, 61<sup>st</sup> Infantry Regiment), the company oriented toward the source of the fire and prepared to meet a possible attack. After the firing ceased, the troops pushed on, thinking that they were once again on the front line. They were supported in this impression when they overran an outpost and collected four more prisoners. The Maoris were very surprised to find the 25<sup>th</sup> Infantry Battalion consolidating at the eastern foot of Miteiriya Ridge, with the division’s final objective, Phase Line Oxalic, along the other, western side of the ridge. Although the headquarters of the 25<sup>th</sup> Infantry Battalion could not be located, an officer of that unit assured Captain Logan that the 25<sup>th</sup> Infantry Battalion was where it was supposed to be.

The critical heavy weapons with the 25<sup>th</sup> Infantry Battalion’s support group continued to work their way forward as P. W. Briant described the final phase of their advance. “*The infantry kept calling for tanks, and so we moved on for about another mile (from the first breach), and then I reported that I couldn’t see the second Bren carrier that was behind us. We turned back and found that the second carrier had run over a mine. The driver was fairly badly wounded and I gave him a morphia injection from the first aid kit. The other two men were OK. We were obviously in a minefield and the tank crews refused to go on until a gap had been cleared. Miteiriya Ridge (the division’s objective) was about a mile ahead, and dawn was just starting to break. It was not long before we could see the Engineers clearing a gap for us . . .*”<sup>148</sup> (Map 12, location ④)

This second Axis minefield which crossed Route ‘B,’ appears to be the minefield that comprised the northwest edge of Mine Box K. This minefield had been emplaced by *Leutnant Junkersdorf*’s 1<sup>st</sup> Company, 220<sup>th</sup> Pioneer Battalion on 22 September. The mines employed in this area were captured Egyptian Pattern antitank mines, laid at a density of one mine per meter of front. Sapper Lieutenant Hanger, describing the action at this second Axis minefield, wrote, “*We eventually went forward a bit behind time but caught up a bit until we found mines, then mines and more mines!! We were getting a bit of hurry up from by-passed machine gun points at this time* (probably from the 11<sup>th</sup> Company, III Battalion, 61<sup>st</sup> Infantry Regiment, the Italian outpost company in the 1<sup>st</sup> South African Division zone where the advance was not going as quickly). Once through the breach, P. W. Briant and the support group had to be diverted to the right into the 25<sup>th</sup> Infantry Battalion’s position, with the first vehicles arriving at about 0530 (Z plus 6 hours and 50 minutes).<sup>149</sup>

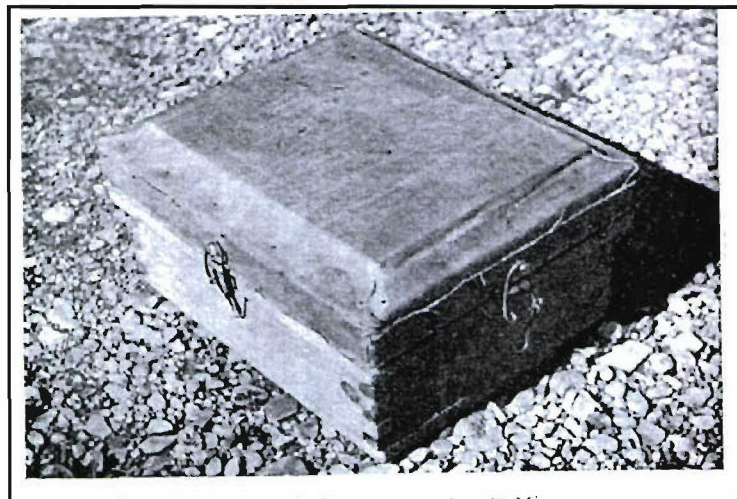
<sup>1</sup> There seems to have been some confusion caused by the incomplete obstacle intelligence that was provided to the New Zealanders. From the available evidence, it would appear that this second Axis minefield was the lateral one that formed the northwest edge of Mine Box K, not the transverse one along Miteiriya Ridge.



Major Reid described this second Axis minefield on Route 'B' as follows, *"The minefield in this area was laid like a draughts board (checker board), with the black squares mined and the white squares left free. Our southern route crossed this field, and the section had to sweep for a distance of 800 yards before getting clear."*<sup>150</sup> This minefield seemed so deep because the New Zealanders were breaching along the grain of the minefield.

Lieutenant Hanger described the rest of the sappers' actions, *"We battled on until first light but as 25 Bn had not reached their final objective (they had dug in half a mile short of the crest of the ridge) we had to stay put. Had a fair bit of curry at first light from Jerry anti-tank overs which were just clipping the ridge above us and then carrying on to make the job of eating breakfast a little uncomfortable."* Major Reid noted, *"The second line of gaps to the south was completed about the same time as the northern one (about 0400), and it was used by transport returning to the start line."*<sup>151</sup> After the first tanks, apparently the Crusader troop with P. W. Briant and the 25<sup>th</sup> Infantry Battalion support group, came up through the engineers' breach, D Company, 28<sup>th</sup> Infantry Battalion returned to their battalion's position west of the first Axis minefield.<sup>152</sup>

Thus far, the attack had cost the 25<sup>th</sup> Infantry Battalion 40 casualties (including at least ten killed). Seventeen casualties (including ten killed) were taken neutralizing the two Italian machine guns and capturing four prisoners; the rest appear to have been caused primarily by shelling. Later in the light of day, at end of Route 'B' at the eastern foot of Miteiriya Ridge, Major Reid made a disturbing discovery. *"At the point where our southern gap met the ridge there were numerous enemy trucks standing. One was loaded with Wooden Box Mines (Photo 75), and had had a front wheel blown off as it turned to get out of their own field. This was the first time these mines had been found. Fortunately none had been laid in our area, but 7<sup>th</sup> Field Company had trouble with them on their sector. They consisted of clumsy wooden boxes filled with our guncotton slabs."*<sup>153</sup> These promised that mine detection in future operations would be considerably more difficult.



**PHOTO 75. Italian Wooden Box Mine, Manufactured in Tripoli. Although Hard to Locate with Electronic Mine Detectors, Only a Small Number was Available at El Alamein**

**6.4.2.3. 26<sup>th</sup> INFANTRY BATTALION ZONE.**<sup>154</sup> The mission of Lieutenant-Colonel Dennis J. Fountaine's 26<sup>th</sup> Infantry Battalion was to attack on the right side of the 6<sup>th</sup> Brigade's zone to seize its objective along Phase Line Oxalic. For the passage of lines on the first objective, Lieutenant-Colonel Fountaine decided to move through the 24<sup>th</sup> Infantry Battalion and the Maoris with his A and C companies in the lead. The battalion's tactical command post (consisting of the Commander, the Intelligence Officer, the Signals Officer, and two signalers with a No. 11 Radio Set.) and B Company would follow close behind, with the rest of the battalion bringing up the rear. The three line companies were to attack across the crest of Miteiriya Ridge and consolidate beyond the last Axis minefield. The battalion headquarters would then be set up on the reverse slope. Initially, all internal communications would be by No. 18 Radio Set or runner; however, the signalers were to lay land line to the companies as soon as they had consolidated on the final objective in order to establish communications by field telephone. Although the line companies were only at three-quarter strength because of sickness, it was expected that



they would be able to extend over the widening front and maintain contact with the infantry battalions on their left and right flanks.

The success of the second phase of the attack largely depended on the early arrival of the battalion's supporting arms. As stated earlier, this presented a much more difficult problem than the dismounted infantry assault. At least two Axis antitank minefields lay between the division's start line and the final objective along Phase Line Oxalic. Each of these would have to be breached in turn by the sappers before the tanks and guns could make the next bound forward. At this point in the operation, Major Reid's No. 2 Section (under Sergeant Allen) had completed the breach along the northern lane, Route 'A,' as far as the brigade's first objective on Phase Line Red. At this point, Lieutenant Andrew's No. 3 Section was supposed to relieve No. 2 Section and continue the breach behind the 26<sup>th</sup> Infantry Battalion to the final objective.<sup>155</sup> However, the commitment of only a single sapper section concerned Lieutenant-Colonel Fountaine, the 26<sup>th</sup> Infantry Battalion commander. He felt that there was a possibility that casualties or slow progress might cause unacceptable delays.

With these issues in mind, he decided to divide his supporting arms into two groups. The first, the "Special Group," was placed under the command of Second-Lieutenant McDonald, the battalion's Carrier Officer. It consisted of two mine-clearing Scorpions, three Crusader tanks from A Squadron, Royal Warwickshire Yeomanry Regiment, two 2-pounder antitank guns (on *portee*'), two Universal Carriers, and four 3-inch (76mm) mortars, also mounted on carriers.<sup>1</sup> This group was to follow the infantry and, if necessary, make its own way through the minefields, with the aid of the Scorpions.

The second group, the "Fighting Transport Group," was under the command of Major McQuade, the Headquarters Company Commander, and was to assemble at a traffic control post that would be established by 6<sup>th</sup> Brigade headquarters east of the first objective (Phase Line Red). They were to remain there until ordered forward by Brigadier Gentry, the 6<sup>th</sup> Brigade Commander. The group would then follow route 'A,' which should have been lighted by the battalion provosts at this point, through the minefield breaches up to the battalion headquarters east of Miteiriya Ridge. The military police had been given an important task. Together with the sappers, they were to follow the 24<sup>th</sup> Infantry Battalion in its advance and prepare a lighted start line on the first objective before A and C companies reached it. After the companies had passed through, they were to light lanes to the battalion headquarters.

At 2246, Lieutenant-Colonel Fountaine had given the order for his battalion to move out of their assembly area. Thirty-five minutes later, the companies had reached their initial start line, just west of the 8<sup>th</sup> Army's last minefields. The rifle companies immediately extended and continued to advance in open formation with sections abreast. Ahead were the men of the 24<sup>th</sup> Infantry Battalion and the dull flash of exploding shells. Although there was a full moon, dust and smoke had reduced visibility to a few meters. As the leading platoons neared Phase Line Red, visibility became worse. On several occasions, there was delay while contact was re-established. Consequently, the lead companies were a few minutes late reaching the second start line, which they were due to cross at 0040 (Z plus 3 hours). The battalion commander radioed both companies not to delay as it was now 0050 and the 4<sup>th</sup> Field Regiment's lifting barrage was now starting to lift. Hastily deploying into an extended line, the four leading platoons set out to catch up with the line of exploding shells. Scarcely anyone had noticed the 24<sup>th</sup> Infantry Battalion or the Maoris on the brigade's intermediate objective along Phase Line Red and, apart from a few lamps, the second start-line had been almost unrecognizable in the poor light.

Soon after leaving the start line, the 26<sup>th</sup> Infantry Battalion caught up with the lifting barrage. During the advance, companies A and C had difficulty maintaining flank contact on the widening front while continuing to move with the lifting barrage. In the poor visibility, it was difficult to judge the exact position of the gradually thinning barrage line. Runners were continually moving from platoon to platoon and to the flanks, to ensure that contact was maintained with the adjacent units. The tracer fire from the 40mm Bofors gun considerably assisted company C on the right flank, and contact with the left-flank company of the 22<sup>nd</sup> Infantry Battalion (5<sup>th</sup> Brigade) was maintained, almost without a break, all the way to the final objective. Unfortunately, a shell splinter damaged C Company's radio set early in the night. This threw a heavy burden on the Company Sergeant Major, Warrant Officer II Neal, and the runner, Private McIndoe, who were continually on the move for the rest of the night carrying

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<sup>1</sup> There is some disagreement between 26 Battalion, pages 186-196 and *The Turning Point, With the N. Z. Engineers at El Alamein*, pages 190-191 on the details of the breach. It seems probable that Major Reid's eyewitness account is the most reliable. Question 11: What was the relationship between the 26<sup>th</sup> Infantry Battalion's "Special Group" and No. 3 Section, 8<sup>th</sup> Field Company?



messages to and from platoons and the company's tactical command post. On the company's left flank, it was a different story. Contact with A Company, 26<sup>th</sup> Infantry Battalion was soon lost, and there seemed to be an ever-widening gap between the two companies as the advance continued. Fortunately, ground opposition was almost negligible, at this stage, and B Company was able to adequately cover the gap by moving up from the battalion's reserve. After receiving several messages from the battalion commander urging him to keep up with the barrage, Captain Horrell and C Company, in the poor visibility, actually overran the barrage. Soon, shells were exploding all around the company, causing eight casualties. Up to this point, the battalion had met negligible opposition as very few Axis troops had been encountered. Of those who had been, some had run away into the haze, others had been killed or captured. These men deployed along the eastern slope of Miteiriya Ridge were probably from the outposts of *Hauptmann* Alfred Krupfganz' II Battalion, 382<sup>nd</sup> Grenadier Regiment, whose main line of defense was dug in along the reverse slope of this ridge. Map 7 indicates that the 6<sup>th</sup> New Zealander Brigade expected to encounter ten machine guns in this area.

Lieutenant Williams, commanding A Company, was having similar problems on the 26<sup>th</sup> Infantry Battalion's left flank. Soon after leaving the start line, contact with C Company, 25<sup>th</sup> Infantry Battalion was lost, but about half way to the ridge No. 8 Platoon (of A Company, 26<sup>th</sup> Infantry Battalion) reported that it had been regained. However, by extending to the left to keep contact with C Company, 25<sup>th</sup> Infantry Battalion, A Company was unable to reach over far enough to the right to link up with C Company, 26<sup>th</sup> Infantry Battalion, and the gap between No. 7 and No. 14 Platoons remained. As they approached the ridge, both companies came under small-arms fire from the left flank (probably from the Sicilians of the III Battalion, 61<sup>st</sup> Infantry Regiment), but it was not heavy enough to hold up the advance. The men walked across the second Axis minefield, which cut diagonally across their line of advance and contained mostly antitank mines, almost without knowing it. Their only casualty occurred when a Company A runner was killed by one of *Oberst* Hecker's scarce antipersonnel mines. On the extreme right flank, No. 15 Platoon was having trouble with a "friendly" 25-pounder firing short. However, nothing could be done about it and the platoon suffered a number of casualties. Consequently, the battalion's tactical headquarters and B Company, not delayed by having to maintain flank communications, overran the forward platoons on several occasions.

At 0140, there was a fourteen-minute pause while the artillery pounded the ridge. During this period, contact between A and C companies was re-established. About this time, Major Moore's sapper reconnaissance parties from the 10<sup>th</sup> Armoured Division caught up with the most advanced New Zealand infantry. While waiting, A Company, 26<sup>th</sup> Infantry Battalion suffered some casualties from Axis shelling and small arms fire. The No. 9 Platoon Commander, Second-Lieutenant Ramsay, was killed while attending to a wounded man, leaving Sergeant Hinton to take over. After the barrage lifted, both companies crossed the dark, smoky crest of Miteiriya Ridge, which was only about five to six meters higher than the surrounding desert, and continued down the forward slope, initially against slight opposition.

At this point, as they entered the main defensive area of the Rheinlanders of the II Battalion, 382<sup>nd</sup> Grenadier Regiment on the reverse slope of Miteiriya Ridge, contact between the A Company, 26<sup>th</sup> Infantry Battalion and the 25<sup>th</sup> Infantry Battalion (which had mistakenly stopped short of their objective along Phase Line Oxalic) on the left was lost. Company A, now near the unit boundary between the German and Italian infantry battalions, was held up several times by the heavy crossfire. The men of C Company met no direct opposition initially; however, small arms and machine gun fire from their left and left rear soon became a problem.

Approximately 600 Rheinlanders of the II Battalion, 382<sup>nd</sup> Grenadier Regiment had about nine heavy machine guns and 27 light machine guns, supported by six 8cm mortars and eight antitank guns with which to face the New Zealand infantry (minus whatever assets were in the outposts on the eastern slope of Miteiriya Ridge). This battalion appears to have been deployed with two companies up (the 5<sup>th</sup> Company on the south and either the 6<sup>th</sup> or 8<sup>th</sup> company on the north) and one back (the 9<sup>th</sup> Company). It was astride the boundary of the 5<sup>th</sup> and 6<sup>th</sup> New Zealand brigades, meaning that the 6<sup>th</sup> Brigade would initially face about the 5<sup>th</sup> Company with about 200 men with three heavy and nine light machine guns as they crossed the ridge. With the Axis machine gunners using fewer tracers than normal, it was difficult to determine in the dark of night where the fire was coming from. In fact, most of the fire seemed to be coming from the Sicilians of the III Battalion, 61<sup>st</sup> Infantry Regiment (with an estimated 350 men in three companies equipped with a total of six heavy machine guns, eighteen light machine guns, four 81mm mortars, and six 47/32 antitank guns) in the 25<sup>th</sup> Infantry Battalion's zone. Advancing beyond the third (unexpected) Axis minefield, which lay west of Miteiriya Ridge, Company A, quickly ran into more trouble, this time from the

machine gun nests of the 5<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment, directly ahead of them. At first, the Bren gunners tried to dislodge the entrenched Rheinlanders but, when this failed, each position had to be taken with hand grenades and the bayonet.

When Lieutenant Williams was about 350 meters beyond the last Axis minefield, he gave the order to A Company to halt, and the men took cover from the still troublesome flanking fire. The lieutenant was not certain if he had reached his objective in the dark featureless desert, and hesitated to go farther until he was certain that the 25<sup>th</sup> Infantry Battalion was on his left. Soon afterwards, he met Captain Horrell, C Company, who had moved his men about 650 meters down the slope before halting. Captain Horrell was making a quick reconnaissance when Sergeant Lock, of the Provost Section, appeared out of the gloom. He had been sent ahead to locate the forward troops, and he informed Captain Horrell that he was too far forward. Nevertheless, the 26<sup>th</sup> Infantry Battalion had just begun to penetrate the main defensive area of the II Battalion, 382<sup>nd</sup> Grenadier Regiment. The company commander then moved his men back about 200 meters, and the three platoons took cover in two shallow, parallel wadis. The company headquarters was set up in some abandoned German trenches.

Lieutenant Williams and Captain Horrell decided to consolidate along the line of the wadis, extending as far to the left as possible to cover that open flank, for it was now clear to them that the 25<sup>th</sup> Infantry Battalion had not advanced over the ridge. Captain Smith's Company B, which was digging between A and C companies, west of the last Axis minefield, had also suffered losses from the crossfire and mortars. While the troops were attempting to dig into the hard desert floor, the fire from *Hauptmann* Alfred Krupfganz' Rheinlanders and Captain Caimi's Sicilians increased considerably as the presence of the New Zealand infantry became known and the temporary, suppressive effects of the artillery fire wore off. As a result, A Company and, to a lesser extent, B Company suffered serious losses. Lieutenant Williams soon lost another platoon commander when Second-Lieutenant Gillett was killed while No. 7 Platoon extended across to the left flank. Success signal flares were fired but, apparently, the battalion headquarters, which at this time was having problems of its own, did not see these signals through the haze. However, Sergeant Lock and Private McIndoe were already on the way back with the news.

By the time the battalion's Tactical Command Post had reached the wadi east of the ridge, it was nearly 0300. The situation there was somewhat confused. An hour earlier, the main battalion headquarters, which had followed B Company during the advance, had been heavily shelled as it neared the ridge. A direct hit had killed three men and wounded several others. Signal rockets and flares were lost, and the batteries and aerial of the No. 11 Radio Set were destroyed, severing all communication with Brigadier Gentry's 6<sup>th</sup> Brigade Headquarters. More important still, battalion headquarters personnel were so badly scattered in the darkness that several hours passed before they could be collected together again. While Lieutenant-Colonel Fountaine carried on with a reduced staff, he sent Sergeant Hay to brigade headquarters with Sergeant Lock's report. Two signalers were also sent back to get another antenna mast and batteries.

While Sergeant Lock was with Captain Horrell, he had been wounded in the face when a captured German gunner threw a grenade at him. However, the brave sergeant refused to be evacuated and, after helping with some of the other wounded, returned to where Lieutenant Andrew's sappers were hard at work, trying to clear a breach through the second Axis minefield, east of the ridge. While lighting the lane through the first Axis minefield to the first objective, along Phase Line Red, all of the military police supporting the battalion had become casualties. It was left to Sergeant Lock to complete this critical task and later guide the 'Fighting Transport Group' forward to the battalion headquarters.

After the improvised explosive device detonation, which had badly mauled No. 2 Section at around midnight, the survivors had been sent back to widen the first gap to 36.5 meters (40 yards) while Lieutenant Andrew's No. 3 Section was brought forward. Lieutenant Andrew, trying to fight off a severe attack of jaundice, led his section to where the second Axis minefield had been located at the eastern foot of Miteiriya Ridge. It was in this belt that Lieutenant Andrew found the first S-mines that the sappers had knowingly encountered that night (Map 12, location©). He suspected that the first minefield had probably been left clear of them, so that Axis patrols could move about freely around the combat outpost line.<sup>1</sup> The sapper officer went ahead of his minesweepers and, contrary to the established battle drill, disarmed the new menaces himself; rather leave this hazardous task to his sappers. This was a very tricky operation, at any time, and in the dusty moonlight, it was extremely dangerous.

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<sup>1</sup> A quick check of the *panzerarmee*'s obstacle plan (Map 4) shows that this was not necessarily the case.



There were only three little wire prongs to be seen, while some were fused with nearly invisible trip wires. Sapper Lieutenant Andrew was later awarded an MC (Military Cross) for his coolness and leadership.<sup>156</sup>

By 0330 (Z plus five hours and fifty minutes), the three rifle companies of the 26<sup>th</sup> Infantry Battalion had consolidated on their kilometer wide objective along Phase Line Oxalic, with C Company on the right, B Company in the center, and A Company on the exposed left flank. By this time, A Company had withdrawn slightly and extended to the left. Heavy shelling prevented B Company from exploiting beyond the captured German positions. Patrols approaching from the left-rear flank were subjected to heavy machine gun fire from the Sicilians of III Battalion, 61<sup>st</sup> Infantry Regiment. All three companies were suffering casualties from the intense artillery and mortar fire on the ridge and the forward slope. The battalion headquarters was also under shellfire. The radio link to the 6<sup>th</sup> Brigade Headquarters was still out and all communication with the line companies had to be sent by runner. No news had been received from Lieutenant-Colonel Bonifant's 25<sup>th</sup> Infantry Battalion, but at 0400 Lieutenant May of the 25<sup>th</sup> Infantry Battalion arrived at the 26<sup>th</sup> Infantry Battalion Headquarters and Lieutenant-Colonel Fountaine was able to estimate the length of the gap between the two units. It appeared to Lieutenant-Colonel Fountaine that the 25<sup>th</sup> Infantry Battalion had not crossed the ridge and, as a result, the flank of the 26<sup>th</sup> Infantry Battalion was exposed, with a 550-meter gap between A Company and the 25<sup>th</sup> Infantry Battalion, on the back side of the ridge. Lieutenant-Colonel Fountaine decided that the Axis fire was too heavy, at this point, to attempt to redeploy his units to cover this flank. Fortunately, some of his troops had been able to use the well-constructed Axis defenses in the area, but the remainder had to try to claw hasty positions out of the unyielding ground. It proved to be impossible to get down more than a few centimeters, but what little dirt was dug from the shallow holes was built up around the sides to give a little protection. While the men were digging in, the Axis had sent up flares against which the New Zealanders were silhouetted. The whole area was now almost continuously under heavy fire and this caused a large proportion of the battalion's casualties.

Shortly after 0400, Captain Rutherford, the 26<sup>th</sup> Infantry Battalion's Medical Officer, and his staff reached the battalion headquarters. To an anxious inquiry about the status of the battalion's heavy weapons, they reported that Major McQuade's Transport Group was still held up to the rear in the Axis minefields. Soon, the Regimental Aid Post (RAP) was set up in the wadi, and almost as soon as it was up, the doctor and Sergeant Bowie set out to collect the wounded from the forward slope. For some time, stretcher-bearers had been carrying the wounded across the battlefield to a central line, where the wounded were left to await evacuation. Some were sheltered in a captured aid station, together with a spectacled German doctor (apparently Doctor Ludwig Helm) and several of his patients, probably from the II Battalion, 382<sup>nd</sup> Grenadier Regiment. From 0430 onwards, Sergeant Bowie spent most of his time in the forward areas, attending to the wounded and helping the stretcher-bearers. On several occasions, he accompanied the doctor in a jeep over ground thickly sown with mines. Back and forth they went, despite the shelling and mortar fire. Twice their jeep was blown up, but another was soon acquired and they carried on as though nothing had happened. Soon, however, Sergeant Bowie suffered a concussion and had to be evacuated, but within twenty-four hours, he was back again. The stretcher-bearers did an outstanding grand job. Corporal Lonie and Private Ives attended to C Company's wounded and moved them back to the collection point in a captured German handcart. It was a tribute to the battalion's medical personnel that only three wounded, of a total of nearly eighty, died of their wounds during the first 24-hours of the operation.

The 26<sup>th</sup> Infantry Battalion's desperately awaited Special Group, under Second-Lieutenant McDonald, encountered a number of unforeseen difficulties as they attempted to move up from the brigade's intermediate objective along Phase Line Red. One of the Scorpions had broken down near the initial start line, leaving the other to lead the tanks, carriers, and guns across the desert. It was dark and clouds of dust and smoke obscured visibility, but everyone was keeping a sharp lookout for the lighted second start line and the 24<sup>th</sup> Infantry Battalion. After travelling about 1800 meters, without seeing anybody or anything, the second Scorpion broke down and the party stopped.<sup>i</sup> Second-Lieutenant McDonald was a little perturbed about the direction in which the tankers had led the party, and he went ahead to examine an object that looked like a man in the distance. Soon, there was a loud explosion, and when Second-Lieutenant Barcock went over to investigate; he found the dead body of Second-Lieutenant McDonald. It turned out that the object was attached to a booby-trapped shell, which had been surrounded by a maze of trip wires. As Second-Lieutenant Barcock was considering his next move, a New Zealand

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<sup>i</sup> This does not agree with Major Reid's account (below), which indicates that the second flail broke down while breaching the second Axis minefield.

sapper officer (apparently, Major Murray Reid) arrived and told the lieutenant that the minefield gap lay south of his axis of advance. This did not help much as the lieutenant and his party were unaware of the line of this axis. Also, about this time, some South African soldiers appeared, and this seemed to indicate that the party had swung south in its initial advance (however, based on Major Reid's account below, it would appear that the South Africans were also lost).

Major Reid continues his description of the events along Route 'A,' *"By this time the tanks and other fighting vehicles were jammed up in the rear of my trucks. They were keen to get ahead, but would not move until we had proved the ground safe. By 4 o'clock next morning we had located the second field, and as the approach to it was littered with trip wires we had to walk with extreme care. A great deal of the small-arms fire had ceased, proving that the infantry were near their final objective. A little enemy shelling was experienced, but no harm done. Out to our right there had been some more enormous explosions, similar to the one which had done us so much harm.*

*The second minefield was located by means of a knocked-out bren carrier, which was seen in the distance and had obviously been mined. As we approached the field a distress signal from the infantry was seen directly ahead. We had plenty of armoured assistance with us, but it was all on the wrong side of the field. Suddenly a tank commander rushed up to me.<sup>i</sup>*

*"There's been a distress signal fired, and I must get my tanks through," he said loudly.*

*"I know, but until we can get a gap for you, it is no use trying."*

*"I can't wait for a gap," he said, and rushed back to his Crusader.*

*I followed him, trying to point out the foolishness of his action. He was determined to "give it a go," and had not gone more than thirty yards when "Bang," and off went one of his tracks.*

*"Perhaps you realise now that I was right," I said, as he returned on foot.*

*"I am going to have another go," he yelled back.*

*"Wait for half an hour and we will let you through safely."*

*"It will be too late then," he said.*

*"Do you realise that you are only wasting valuable equipment and endangering the lives of your men?"*

*He made no reply to this, but boarded his second tank and set off. He followed the tracks of the first tank, and then swung to the left to go round it. As he drew level with it there was another report. That now made two tanks sitting side by side in the minefield, both finished as far as the attack went.*

*This officer was no doubt a brave man, but rather impetuous. He was very excited, and was evidently carried away with his own keenness. Of the 'Special Group,' the three Crusader tanks and three of the carriers (including one mortar carrier) were soon blown up as they attempted to 'bull through' the minefield. However, the rest of the group (two 2-pounders antitank guns and three mortar carriers) did eventually get through the second Axis minefield and reach the 26<sup>th</sup> Infantry Battalion.<sup>ii</sup>*

Major Reid continued his description of this breach, *"Our Scorpions had traveled with us from the start line, but there had been nothing for them to do. Soon after passing the first objective one of them broke down.<sup>iii</sup> In view of the distress signal we tried a Scorpion to force a narrow passage through. It set out in great style, with the flails throwing up huge clouds of dust until it was invisible. I do not think it traveled more than few yards before it, too, had a breakdown. The third one waddled up but stopped as it swung into position and refused to budge again. There were our three Scorpions all out of commission. The breakdowns were most unfortunate, as we had there a wonderful chance to try them out.*

*When we examined the width of this field we found that by shifting the gap 100 yards to the north we could get through with about a third the length of gap required in the original spot. The work in the narrower place was*

<sup>i</sup> It would appear that this 'tank officer' was, in fact, Second Lieutenant Barcock. The accounts of these two officers (Second Lieutenant Barcock and Major Reid) vary on some of the particulars.

<sup>ii</sup> Despite their advances in vehicle recovery, the 8<sup>th</sup> Army still did not include vehicle recovery assets with the breach force. Many disabled vehicles, such as these, obstructed the narrow lanes through the minefields, forcing the sappers to clear additional ground around immobilized vehicles that could have been quickly towed clear of the minefields if vehicle recovery assets had been provided to the breach forces. It should be noted that the 8<sup>th</sup> Army did not begin to recover disabled vehicles in the 2<sup>nd</sup> New Zealand Division area until 25 October.

<sup>iii</sup> It would appear that Major Reid is referring to the Scorpion which had started the operation with P. W. Briant and the 25<sup>th</sup> Infantry Battalion's support group, but had become entangled in barbed wire in the first Axis minefield, as described earlier.



carried out in quick time, and by 5 a.m. all the armour and fighting vehicles were passing through. The mines were all E.P. Mk II—more of our own make. As previously mentioned, these mines are particularly dangerous to handle having been laid for some time, so we blew them up where they were found. The mines were connected up with Primacord, instantaneous detonating fuse, and a plug of gelignite placed on top of each mine. A short length of safety fuse was used to ignite the circuit, and all the party went to ground as the mines disappeared with a terrific bang. The air was very still and the smoke and dust obliterated everything for some time. It was the work of a few moments to check up that all the mines had detonated, and then the gap was ready to use.

By this time there was a solid line of tanks, carriers, armoured vehicles, and trucks right back to the start line, over two miles to the rear. In many places they were two and three abreast, and I had never seen so much heavy transport in one spot. What a wonderful target they would have made from the air!

The first vehicle through the gap after our trucks was a big Sherman tank. It was sitting in the mouth of the gap effectively blocking anything else. I gave the commander the word to go, but do you think he would move? Not he. He had to have orders from his commanding officer, and until he received them he refused to move. As I knew how much transport there was in the rear of him I was furious. He tried to make contact with his commanding officer by wireless, but had no success. All this time daybreak was drawing nearer, and I was very worried about the tanks and the other vehicles being caught by bombers. In desperation I ran down the line until I found the "tank colonel." He soon shifted things, and I would hate to have been in that subaltern's shoes next time he met his colonel. It was a bad show.<sup>i</sup>

This minefield was right at the foot of the Miteiriya Ridge, and as the tanks moved forward they spread out along the slope and disappeared in the dust and darkness. The sappers worked along the ridge, finding safe country for the transport to disperse. Another minefield was found on top of the ridge, and as we were preparing to go forward to it daylight arrived. This job was cancelled by the Brigadier, as it would have been disastrous to have attempted to get over the ridge in the full light of day.

Within a few minutes of blowing up the mines in the last gap a perturbed officer rushed up to me.

"What was that big explosion just now?" he asked.

"We blew up the mines instead of lifting them," I replied. "Why do you ask?"

"Thank God for that," he said, visibly relieved. "Just as the explosion took place I caught my foot in a trip wire and thought I had set off a big booby trap. My word, I am relieved."

He went off quite happy again, but stepping high to make sure he did not trip on another.

While waiting for the last gap to be cleared an officer from a carrier walked away to one side of the vehicles. He had not gone more than ten yards when he was blown to pieces. When I inspected this area in daylight it was a wonder to me that many more were not killed, as the place was full of trip wires and booby traps.<sup>iii</sup> By 0500 (Z plus seven hours and twenty minutes), an hour and a half after the 26<sup>th</sup> Infantry Battalion had begun its consolidation along Phase Line Oxalic, Major Reid's sappers had opened the northern breach along Route 'A,' all of the way to the 26<sup>th</sup> Infantry Battalion's headquarters. This was an incredible performance; however, there still remained a third, unexpected Axis minefield on the other side of Miteiriya Ridge. Further back, the survivors of No. 2 Section had widened the breach through the first Axis minefield to 36.5 meters (40 yards) and were working to locate some safe, mine free areas for vehicle dispersal.<sup>157</sup>

At this time (about 0500), there was still no sign of the 26<sup>th</sup> Infantry Battalion's supporting arms on Miteiriya Ridge. Lieutenant-Colonel Fountaine was very concerned about his open left flank and had hoped to get his antitank guns sited to cover it before dawn. However, just before first light, Second-Lieutenant Barcock finally arrived with the remains of the battalion's 'Special Group,' two 2-pounders and three 3-inch (76mm) mortar carriers, all that had survived bulging through the second Axis minefield. Lieutenant-Colonel Fountaine immediately ordered him to take the two antitank guns forward and site them to cover the forward line companies. Meanwhile, the three 3-inch (76mm) mortars were directed to dig in along the ridge. The two 2-pounder antitank gun crews were able to negotiate the last Axis minefield without loss. Second-Lieutenant Barcock then positioned his antitank guns about midway between and close behind the companies. Nearby, there was the German aid station. Axis shelling was very heavy and, before the guns were properly dug in, one gunner, Sergeant Thorburn, was wounded. The German doctor was brought over, but before he could attend to the wounded man, the Axis scored a

<sup>i</sup> This Sherman was most likely from B Squadron of Lieutenant-Colonel Jackson's Royal Warwickshire Yeomanry Regiment.

<sup>iii</sup> This is most probably a reference to the death of Second-Lieutenant McDonald, if so, the sequence of events as described by the eye witnesses, Major Reid and Second-Lieutenant Barcock, once again, differ on the particulars. *The Turning Point, With the N. Z. Engineers at El Alamein*, pages 189-193.



direct hit on the gun. Sergeant Thorburn was killed and Second-Lieutenant Barcock and the doctor were wounded. Fortunately for them, the other antitank gun was able to dig in without mishap and did some good work later in the day. By daylight, Private Scanlan and his linesmen had run field telephone lines to B and C Companies, enabling them to call in artillery support.

Meanwhile, Major McQuade's 'Fighting Transport Group,' with the rest of the battalion's supporting arms, had reached the battalion headquarters, just east of Miteiriya Ridge. However, by the time they reached the battalion's headquarters, it was too light to send any more support weapons over the ridge to the forward companies, so a gun-line was formed along the crest of Miteiriya Ridge and its reverse slope. Beyond it, the signalers continued laying communications wire through to the companies. By this time, the No. 11 Radio Set had been repaired and the battalion was again in contact with Brigadier Gentry's 6<sup>th</sup> Brigade Headquarters. Major McQuade's Transport Group had been delayed mainly by the time required to clear the breach through the first Axis minefield. Initially some delay had occurred at the traffic control point through the first Axis minefield, where vehicles from the 24<sup>th</sup> Infantry Battalion had blocked the passage of the group. When Major McQuade reached the breach through this minefield, the surviving sappers of No. 2 Section were hard at work with bayonets prodding for mines to widen the gap to 36.5 meters (40 yards). They were making slow progress, and Major McQuade decided to move his guns and vehicles into the gap so that there would be no delay when the job was completed. Shortly afterwards, the leading Shermans of B Squadron, from Lieutenant-Colonel Guy Jackson's Royal Warwickshire Yeomanry Regiment of Brigadier Currie's 9<sup>th</sup> Armoured Brigade arrived and also attempted to crowd into the narrow lane in the minefield. In the resulting confusion, Major McQuade's column broke into several small groups, separated by the tanks. When the sappers finally reported that they had finished widening the breach, more confusion was caused as each tank and truck tried to get through first. Major McQuade, with Sergeant Lock helping him, was able to feed his group through piecemeal. Then, Sergeant Lock directed them to the wadi where the battalion headquarters had been established. The arrival of the supporting arms and the tanks of the Royal Warwickshire Yeomanry Regiment reassured Lieutenant-Colonel Fountaine and his men. The heavy weapons of the Transport Group were placed in a position to cover the immediate front and the exposed left flank, as the tanks of the yeomanry attempted to continue the advance down the forward slope of Miteiriya Ridge.

As the light increased, the New Zealanders on the west side of Miteiriya Ridge could see that the ground ran gently down through a shallow depression and up to the low-lying crest of El Wishka Ridge, about 3500 meters to the west. In the words of one officer, the area '*was as bald as a billiard table*.' While this created problems for the 26<sup>th</sup> Infantry Battalion in that it allowed the Italian tankers of the XII Battalion, 133<sup>rd</sup> Armored Regiment (part of *Oberst Willi Teege's Kampfgruppe Sud*) to watch all movement, in this area, from El Wishka Ridge, it also minimized the chances of a successful counterattack in daylight. *Kampfgruppe Sud* had a combined strength of about twelve antitank guns (six 5cm PAK38s and six 47/32s) and 79 medium tanks (including eight Panzer IVf2s and fourteen Panzer IIIJs) plus eight 75/18 *Semovente* assault guns as well as sixty machine guns and twenty-four field artillery pieces (Table 24 and Appendix I).

Captain Attilio Caimi's III Battalion, 61st Infantry Regiment, which still held the 25th Infantry Battalion's objective along Phase Line Oxalic, caused a more acute problem. The III Battalion, 61<sup>st</sup> Infantry Regiment had about six heavy machine guns, eighteen light machine guns, and four 81mm mortars in three companies echeloned one (apparently the 9<sup>th</sup> Company was foremost, followed by the 12<sup>th</sup>, and then the 10<sup>th</sup>) behind the other in this position (Map 8). Mortar and small-arms fire from this area, had already caused casualties to A and B companies and was hampering movement on the battalion's left flank. On the 26<sup>th</sup> Infantry Battalion's right flank, some Crusader tanks from A Squadron, Royal Warwickshire Yeomanry Regiment had attempted to reach C Company. In their move forward, A Squadron had left four more of their number immobilized by mines in the last Axis minefield, which the sappers had been ordered by Brigadier Gentry not to attempt to breach in daylight. Nevertheless, three of the Crusaders managed to reach C Company, 26<sup>th</sup> Infantry Battalion soon after dawn but they attracted heavy fire onto the area. Soon, one was hit and the other two then withdrew to the shelter of Miteiriya Ridge, earning the thanks of the New Zealand infantrymen who had suffered most from the shelling. The disabled Crusaders they left behind were used for target practice by the Axis gunners throughout the rest of the day and were soon reduced to twisted wreckage.

With the arrival of some of their supporting arms, the situation for the New Zealanders of the 26<sup>th</sup> Infantry Battalion was more or less stabilized. The companies of the battalion had succeeded in reaching their objectives, and though they had subsequently withdrawn slightly, the attack had achieved its purpose. Company C was in

contact with the 22<sup>nd</sup> Infantry Battalion (now the adjacent battalion of Brigadier Kippenberger's 5<sup>th</sup> Brigade to the north), but there was a wide gap on the left flank. In addition, the battalion had captured several antitank guns and "Spandau" (MG34 or MG42) machine guns intact, apparently from the 5<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment. The lack of a sufficient number of infantrymen and heavy Axis fire had prevented the 26<sup>th</sup> Infantry Battalion from extending across the length of its 1,200-meter front. Few prisoners had been taken and, although there were a number of dead German grenadiers lying about, it seemed to the New Zealanders that the Rheinlanders of the II Battalion, 382<sup>nd</sup> Grenadier Regiment had successfully withdrawn in the face of the attack.

In the early morning light, Major Reid was finally able to investigate the events of the previous night, *"The area to the north of our route was littered with aerial bombs; some were standing on their bases and others lying down. Most of them were roughly disguised in various ways, with old blankets or ground sheets thrown over them. Our suspicions were aroused immediately. Here perhaps was the answer to the big explosions during the night. We approached one cautiously to examine its works. Low trip-wires radiated in four directions from near the bomb. These wires were tied to pull igniters placed inside a French anti-tank mine. The mine was buried just under the surface of the desert and connected to a German Teller mine. Projecting from the side of the teller was another pull igniter, to which was attached a long length of wire. I followed this wire for more than 200 yards, and even then did not find the end of it. The wire formed a remote control, and it could be used to set off the whole devilish mechanism from a distance. The French mine was also connected to the 500-pound (227 kilogram) aerial bomb with an instantaneous detonating fuse, so that in the event of an unfortunate person hitting any of the trip wires the whole lot would have exploded instantly. We all carried short lengths of fine wire to serve as safety pins, and, slipping them into the requisite holes in the igniters; we soon had the whole thing harmless. There must have been fifty of those fiendish traps lying about. Some of the infantry had crossed that area and undoubtedly suffered casualties, for many huge craters could be seen.*

*I went back immediately to the scene of our own tragic experience. Although hundreds of tanks and trucks had passed over the track I was able to reconstruct the whole incident. Buried in the dust I found the short angle iron pickets and trip wires, with two craters alongside the track, a small one caused by the mines and a huge one caused by the bomb. It is remarkable that any of us lived to tell the tale. Our recent companions—Sergeant Allen and Sappers Petty, Perry, and Windsor—were buried close by.*

*These huge booby traps had been laid in the shape of a diamond. Our course crossed one corner of the diamond, and it was the outside bomb which we had encountered. Had we been fifty yards further south we would have missed them altogether. The most tragic part of the whole affair was that once again the enemy had used captured materials. They were R.A.F. bombs. Although some of these improvised explosive devices had been set off by shellfire, many more were untouched, especially towards the final objective where the lifting barrage was thinnest. Upon closer examination, it was found that a typical trap was based on a camouflaged British 500-pound (227-kilogram) aerial bomb. This bomb was connected through firing devices to two antitank mines, with trip wires, radiating from them like the web of an evil spider, as well as a remote-control firing-wire leading to an Axis observation post, for command detonation. The whole contraption was set to explode by a slight increase in tension on any of the trip wires (Map 12, location①). During the day of 24 October, the sappers would disarm several others by the hazardous process of inserting a fine wire into each of the firing devices.<sup>158</sup>*

### **6.4.3. PROGRESS OF ADJACENT UNITS TOWARD PHASE LINE OXALIC**

**6.4.3.1. NEW ZEALAND 22<sup>nd</sup> INFANTRY BATTALION.** Lieutenant-Colonel Campbell's 22<sup>nd</sup> Infantry Battalion crossed their start line on Phase Line Red at 0055, without having encountered the 23<sup>rd</sup> Infantry Battalion (which had advanced beyond their objective). The 22<sup>nd</sup> Infantry Battalion had already suffered some casualties from short rounds fired by the 4<sup>th</sup> Field Regiment during their movement forward. After the advance had resumed, the left flank of the battalion met elements from the 23<sup>rd</sup> Infantry Battalion as they withdrew back to their correct positions along Phase Line Red. The men from the 23<sup>rd</sup> Infantry Battalion reported that they had struck heavy opposition from Axis positions further forward. Soon, D Company, 22<sup>nd</sup> Infantry Battalion reported that they were being held up by the same outposts and had lost contact with the 26<sup>th</sup> Infantry Battalion on their left. Company C, 22<sup>nd</sup> Infantry Battalion moved forward and eliminated the opposition, enabling the advance to resume. By 0235, all of the companies reported that they had reached their objectives along Phase Line Oxalic. By 0430, the 22<sup>nd</sup> Infantry Battalion had consolidated on their objective with their most forward positions about 900 meters beyond the crest of Miteiriya Ridge. The 22<sup>nd</sup> Infantry Battalion had suffered 110 casualties, one third of the riflemen who

participated. They had captured 150 men (probably most of which were from II Battalion, 382<sup>nd</sup> Grenadier Regiment, thus severely damaging the 6<sup>th</sup> or 8<sup>th</sup> company).<sup>159</sup> To their right, a composite platoon from the 21<sup>st</sup> Infantry Battalion had exploited forward into the main battle position of the Sicilians of Captain Manassei's II Battalion, 62<sup>nd</sup> Infantry Regiment. As a result, they had captured 90 prisoners (the rest of their battalion took 40 more), blew up four 105mm howitzers (apparently from the German 1<sup>st</sup> Battery, I Battalion, 220<sup>th</sup> Artillery Regiment) and three antitank guns (probably 47/32s) as well as some machine guns. They returned to their lines by 0430. Their initiative opened the door for the following armor of the Royal Wiltshire Yeomanry Regiment.<sup>160</sup>

**6.4.3.2. SOUTH AFRICAN CAPETOWN HIGHLANDERS REGIMENT.** The Capetown Highlanders resumed their advance at 0030. At 0200, their battalion headquarters was delayed in the first Axis minefield by three knocked out armored cars, which blocked the breach. As a result, they had lost contact with their companies. At 0350, Captain Attilio Caimi's Sicilians of the III Battalion, 61<sup>st</sup> Infantry Regiment still held up the advance of the Capetown Highlanders. Finally, the breach through the first Axis minefield was cleared again, allowing the battalion headquarters to come forward at 0425. The battalion's supporting weapons soon followed them. At 0515, they linked up with the forward companies. By dawn, the Capetown Highlanders were established on Miteiriya Ridge, several hundred meters short of their objective, Phase Line Oxalic. By 0800, the battalion had emplaced its heavy supporting weapons and was dug-in. They had suffered a total of forty casualties. In their attack, the 1<sup>st</sup> South African Division had captured a number of Axis prisoners. XXX Corps later identified them as three officers and 48 men from the Italian III Battalion, 61<sup>st</sup> Infantry Regiment (probably most of which probably came from the 11<sup>th</sup> Company, along with the loss of about two heavy machine guns and eight light machine guns). Two other men had been brought in from the 3<sup>rd</sup> Battery, 46<sup>th</sup> Artillery Regiment, 102<sup>nd</sup> Trento Division. Later in the morning (at around 1050), the Capetown Highlanders captured three men. These were Germans from the III Battalion, 433<sup>rd</sup> Grenadier Regiment.<sup>161</sup>

#### **6.4.4. JOINTLY HELD SECTOR OF THE ITALIAN 62<sup>nd</sup> INFANTRY REGIMENT AND THE GERMAN 382<sup>nd</sup> GRENADIER REGIMENT**

With the intensity of the Allied barrage, General Gloria, commander of the Italian XXI Corps, was certain that this was the beginning of "*those large-scale offensive operations which for several days the Army Headquarters and the Defense Intelligence Service had reported to be imminent.*" The Axis situation quickly deteriorated. Between midnight and 0130, almost all of the outpost companies in the zone of attack had been overrun, allowing the Allies to continue to advance toward the main line of resistance.<sup>162</sup> Indeed, at 0115, *Generalmajor* Lungerhausen, commanding the 164<sup>th</sup> *Leicht Afrika* Division, reported to the headquarters of the 15<sup>th</sup> Panzer Division that the Allied units in and around Mine Box L were approaching the main line of resistance. At this point, *General der Kavallerie* Stumme ordered the 15<sup>th</sup> Panzer Division to prepare to counterattack at dawn and regain control of the old main line of resistance. At 0150, *Oberstleutnant* Markert, Operations Officer for the 164<sup>th</sup> *Leicht Afrika* Division, reported to the 15<sup>th</sup> Panzer Division that the Italian II Battalion, 62<sup>nd</sup> Infantry Regiment, opposite the 5<sup>th</sup> New Zealand Brigade, had been badly damaged by the artillery barrage. The apparent destruction of this battalion left the II Battalion, 115<sup>th</sup> Panzer Grenadier Regiment and the Italian XII Battalion, 133<sup>rd</sup> Tank Regiment, in the second line of defense, to halt the Allied advance and seal the breach. In fact, one company of the II Battalion, 62<sup>nd</sup> Infantry Regiment continued to resist for a time. Both of the adjacent German infantry battalions (the II and III battalions, 382<sup>nd</sup> Grenadier Regiment) had been able to hold their own, so far.<sup>163</sup>

#### **6.4.5. ALLIED FOLLOW-ON ELEMENTS**

For General Freyberg, waiting in his headquarters, it had been a long night waiting for information. At 0100, the situation was still unclear. In fact, the two leading infantry battalions had taken their first objectives just about on time, around 2300. By 0230 (Z plus four hours and fifty minutes) all four of the 2<sup>nd</sup> New Zealand Division's breach lanes were open through the first Axis minefield to the intermediate objective, along Phase Line Red, with the lanes marked by signs and lights and patrolled by the military police. However, their vehicles had to move slowly while the sappers searched for stray mines. Small pockets of resistance, missed by the infantry, had also caused some delay as the sappers were forced to cease their work and eliminate these before they could continue clearing the mines.<sup>164</sup>

In fact, by 0230 reserve engineer parties were already at work widening the lanes with the follow-on elements hard on their heels. Although the New Zealand sappers had used both Scorpions and mine detectors, both



had proven to be technically unreliable such that probing the ground with bayonets, a method that by necessity was both slow and deliberate, still had done most of the clearing.<sup>165</sup>

As Major Reid's sappers slowly advanced each breach, a dense column of vehicles (tanks, Bren carriers, mortar carriers, antitank guns, signals trucks, ambulances, and logistics vehicles) waited impatiently for their opportunity to advance. As mentioned earlier, the support column of the 24<sup>th</sup> Infantry Battalion came first on the intermediate objective. After these had dispersed off the marked route, the columns of the other two infantry battalions (the 25<sup>th</sup> and the 26<sup>th</sup>) were passed through. With these was the Crusader troops from the Royal Warwickshire Yeomanry Regiment of the 9<sup>th</sup> Armoured Brigade assigned to give direct support to the infantry. The Stuart light tanks of the Divisional Cavalry Regiment on Route 'B' came next behind the 25<sup>th</sup> Infantry Battalion during the advance to the final objective. The rest of the Royal Warwickshire Yeomanry Regiment and the 3rd Hussars Regiment followed the cavalry, with their Sherman and Grant squadrons leading. Bringing up the rear was the headquarters of the 9<sup>th</sup> Armoured Brigade. Traffic discipline, overall, was good. However, there were instances of drivers taking their vehicles off the cleared ground, into the minefields and being immobilized. This usually occurred when impatient support group commanders tried to take short cuts with their units across uncleared ground around the traffic. These commanders knew how vulnerable their dismounted infantry battalions were without them and that it may be critical for their weapons to arrive before dawn.<sup>166</sup>

Finally, at 0300, both brigades confirmed that they had taken their first objectives, along Phase Line Red, with this news General Freyberg began to move forward to Miteiriya Ridge with his tactical headquarters. At 0400, Brigadier Kippenberger's 5<sup>th</sup> Brigade confirmed that they had taken their final objectives along Phase Line Oxalic. However, there had been no reports for some time from the 6<sup>th</sup> Brigade. Finally, at 0530, the 6<sup>th</sup> Brigade reported that both of their routes were through.

**6.4.5.1. 2<sup>nd</sup> NEW ZEALAND DIVISION CASUALTY EVACUATION EFFORT.**<sup>i</sup> The medical personnel of the 2<sup>nd</sup> New Zealand Division recognized that the deep Axis minefields would make the collection and evacuation of casualties very difficult. Therefore, they implemented a standard system of evacuation through the minefields. Initially, ambulances were stationed near the line of departure to collect any early casualties. As soon as each breach through the first Axis minefield was opened, a convoy of ambulances was sent to clear the regimental aid post that was established on the other side. The ambulances that were detailed to pick up casualties from the regimental aid post were not supposed to turn back with wounded picked up while moving up along the route. After this, the cleared tracks were patrolled by ambulance and if available, a 3-ton truck marked 'walking wounded' up to the second Axis minefield. After the latter was cleared, a similar regimental aid post evacuation drill was carried out. Ambulance drivers were instructed not to leave the lighted safe lanes because of the known presence of scattered mines outside the main minefields. Two-way traffic was difficult along the 14.6-meter wide lanes. It was particularly dangerous to attempt to by-pass the waiting concentrations of armor that often blocked the routes. To bypass the traffic jams, it was, of course, necessary to leave the cleared path at times and take a chance of running over a mine or perhaps into a slit trench. However, during the night, only one ambulance was lost in a minefield. Each RMO (Regimental Medical Officer) used his attached ambulance to collect the accessible casualties on the battlefield.

The medical commander had to be careful to avoid over-committing his ambulances forward since he had to be able to evacuate serious casualties from the division to the rear. As stated earlier, before the attack, all of the New Zealand soldiers were instructed that casualties were to make their way by walking or litter to one of the four brigade lanes. The evacuation of litter cases proved particularly dangerous in the areas around the unmarked minefields. After reaching a cleared lane, the walking wounded were directed to walk back to first gaps in the first Axis minefield, from there, signs led to the medical treatment stations. Ambulances were sent forward to evacuate litter cases. The military police, controlling the traffic through the minefield breaches, were specially instructed to assist the ambulances by turning their minefield marking lights to show both ways as soon as operations permitted. Before this, if they heard an ambulance approaching, they could guide it by voice, or by reversing their marking

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<sup>i</sup> The carefully planned scheme for the evacuation of wounded through the minefields proved highly successful and became the standard in the 8<sup>th</sup> Army. The information in this section is extracted from Stout's *New Zealand Medical Service in Middle East and Italy*, Official History of New Zealand in the Second World War 1939-1945, War History Branch, Department of Internal Affairs, Wellington, 1956. p. 382-401, unless otherwise noted.

lights for a brief moment. By the end of the first 24 hours of the operation, the 2<sup>nd</sup> New Zealand Division's medical personnel would have treated 839 casualties (including men from British and South African units).<sup>167</sup>

**6.4.5.2. 2<sup>nd</sup> NEW ZEALAND DIVISION CAVALRY REGIMENT.** At the beginning of the night, the 25 American-built Stuart light tanks and 23 universal carriers of the division's cavalry regiment slowly worked their way forward on Boat Track, along the inter-brigade boundary, well behind the 6<sup>th</sup> Brigade's leading elements. For the attack, the cavalry had been reinforced with a sapper detachment of five sappers under Sergeant Smith. These men were responsible for any light mine clearance or the hasty demolitions of any captured or abandoned Axis tanks and guns needed by the cavalry. Lieutenant-Colonel J. H. Sutherland's cavalry was part of a wave fifty kilometers deep, surging steadily on. Once passed the Allied minefields, they shifted to Route 'B,' behind the 25<sup>th</sup> Infantry Battalion, in the 6<sup>th</sup> Brigade zone.<sup>168</sup> There was nothing much for these men to see except the lighted signs slowly looming up and then disappearing behind in the murk. On the ground, to either side of the column was the white engineer tape, which marked the edges of the cleared lane. Sometimes, the markers or tape was knocked over or missing, causing vehicles to drift into uncleared areas. Little by little the moonlight faded as the dust-cloud became thicker. Now and again, a stationary figure was passed, a military policeman perhaps or figures walking back, probably walking wounded; or a stationary vehicle, perhaps blown up on a mine after it wandered out of the safe lane. On and on the column crawled, slowly through the dark and dust, and the ever-present clamor of the guns. Their trip lasted all night, but despite the heroic efforts of the leading infantry and sappers, the forward squadron of the division cavalry regiment, with the five sappers commanded by Sergeant Smith from the 5<sup>th</sup> Field Park Company, did not reach Miteiriya Ridge until daybreak.

On the east side of Miteiriya Ridge, the regiment came to a halt. Although two of the three infantry battalions of the 6<sup>th</sup> Brigade had reached their assigned objectives, Brigadier Gentry had decided at dawn to halt the sappers from breaching an unexpected third Axis minefield on the exposed slope of Miteiriya Ridge, as it was now covered by heavy Axis fire. It appeared to him to be nothing short of suicide for the division cavalry regiment's six dismounted sappers to try to open a breach in daylight and there were no operational Scorpions available. Indeed, the New Zealanders believed that any Scorpions that had survived the initial breach were under orders to return to their starting positions as soon as they reached the top of Miteiriya Ridge, where it was believed that the minefields ended.<sup>1</sup> As a result of Brigadier Gentry's decision, the New Zealand sappers did not attempt to breach this last Axis minefield at this time and the cavalry could not exploit to the southeast, as General Freyberg had directed.<sup>169</sup> Since the cavalry could not advance beyond the last Axis minefield, they were directed to move laterally along the eastern slope of Miteiriya Ridge, behind the 26<sup>th</sup> Infantry Battalion, across Route 'A,' to the center of the 2<sup>nd</sup> New Zealand Division's zone. Here, they were to occupy a position astride Boat and Ink tracks, which were the responsibility of the 10<sup>th</sup> Armoured Division.

**6.4.5.3. BRITISH 9<sup>th</sup> ARMoured BRIGADE.** After spending the day of the 23 October making final preparations, the brigade had finally formed up on Bottle Track in a "Double Line Ahead" formation at 2000 hours. The brigade was arrayed with the Royal Wiltshire Yeomanry Regiment in the lead, followed by the Royal Warwickshire Yeomanry Regiment, the tactical headquarters of the brigade, and finally, the Third Hussars Regiment. Brigadier Currie's tankers had a slow and dusty move forward. At midnight, the New Zealanders reported that they had reached their first objective. At 0230, the New Zealanders reported to the Royal Warwickshire Yeomanry that they had reached their final objectives along Phase Line Oxalic. At 0300 the 9<sup>th</sup> Armoured Brigade deployed with the Royal Wiltshire Yeomanry Regiment following the 5<sup>th</sup> Brigade while the rest of the 9<sup>th</sup> Armoured Brigade followed the 6<sup>th</sup> Brigade on Route 'A' and began to move through the first Axis minefield.<sup>170</sup>

**6.4.5.3.1. ROYAL WILTSHIRE YEOMANRY REGIMENT.** In the 5<sup>th</sup> Brigade sector, Lieutenant-Colonel Peter Sykes' Royal Wiltshire Yeomanry Regiment, using a breach cut by the last operational Scorpion in the division, reached the crest of the ridge just as dawn broke (sunrise at 0620).<sup>171</sup> Charles Philbrick, commander of one of the new mineclearing Scorpions from the 44<sup>th</sup> Battalion Royal Tank Regiment, left a description of what

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<sup>1</sup> *Alamein*, pages 174-175. However, this is contradicted by Lieutenant-Colonel McMeekan, the Chief of Royal Engineers for the 10<sup>th</sup> Armoured Division who wrote, "We had no time to train with them (the new Scorpions), so General Gatehouse arranged with General Freyburg that our three "Scorpions" should work with those of the New Zealand Division on the opening night, provided that all remaining runners should go forward through the gaps with us." "The Assault at Alamein," page 324.



appears to be this action, *"We couldn't see much for the dust we were kicking up with the flails, but it seemed a long way. It was like driving around in a steel box, when closed down. There was a periscope but the German anti-tank gunners knew all about them. But we were successful and reached our stage point, but the noise was still terrific. All we could see were the gun flashes lighting up the troops and tanks and a rush of Bren carriers coming through where we'd cleared. We stopped having done our job . . ."*<sup>172</sup> The tankers of the Royal Wiltshire Yeomanry Regiment also discovered that the Scorpions did not detonate all of the mines and had a habit of throwing live mines back at the trailing vehicles, immobilizing two of the six Crusaders from 'B' Squadron that were in close support of the 5<sup>th</sup> Brigade.

Shortly after 0600, the Shermans of 'A' Squadron were guided over the ridge into the area swept of Italian infantry and a German artillery battery by the 21<sup>st</sup> Infantry Battalion.<sup>173</sup> Major Blount, the Commander of 'A' Squadron described the action, *"'A' Squadron, leading emerged from the cleared lane through the minefields about 15 minutes before first light, intending to deploy into battle formation at once. But visibility was only a few yards and there appeared to be areas, faintly distinguished by low single strand barbed wire, which seemed like uncleared mines, so we remained closed up in single file until we had gone forward another quarter mile. As the sky lightened, it would have been foolish to go over the top of the ridge in that formation, and I gave the order to deploy as we approached the crest.*

*Immediately they started to spread out the majority of our tanks ran onto mines but the urgent need to get in front of the N. Z. infantry before daylight made it essential to press on.*

*Only five Shermans reached the forward slope of Miteiriya Ridge and took up firing positions five or six hundred yards beyond it, in slightly undulating but uncomfortably exposed ground, where the leading N. Z. units were consolidating.*"<sup>174</sup>

The regimental history of the Royal Wiltshire Yeomanry Regiment also described this action, *"The supporting arms and the tanks are said to be moving up. And so they are, but all is not well with the Royal Wilts. Those in the rear of the column have been speculating about the origin of a new addition to the carnival of noise, which is going on around them. Something different, this one. Deeper and more earth shaking than the rest. Woomph! This is quite unmistakable. A very sinister sound. Big aerial bombs, perhaps? But they really know instinctively what causes those noises, even though they have never heard them before. Mines! Why mines? Something must have gone wrong. The first squadron ought to be clear of the minefields now. There are no mines where those noises come from. Or shouldn't be, according to the air photographs. But Woo-mph! There it goes again. And this time there is no mistake. A spurt of flame appears in the distance through a gap in the fog and quickly grows into a flaming mass. Little figures jump out and run for their lives as the sand spurts up around them in the eerie light from the burning tank. For it is a tank. They can see that clearly now. What's more its one of their Shermans and the Boche are turning everything they've got on to the crews as they scurry for safety. Something has gone wrong.*"<sup>175</sup>

Soon, the trailing Grants of 'C' squadron moved up to join them on their right (to take advantage of the Grants' 75mm gun which was mounted in a sponson on the right side of the hull). However, the Grants of 'C' Squadron met a similar fate, with only four or five of their tanks reaching the Shermans of 'A' Squadron. In this action, the heavy squadrons of the Royal Wiltshire Yeomanry Regiment had lost 6 Shermans and 3 Grants to mines alone. Major Lord Weymouth decided to hold back the 2-pounder equipped Crusaders, as they would be of little use against the German panzers. Thus did the reservists ('territorials') of the Royal Wiltshire Yeomanry Regiment earn the honor of being the first Allied armored regiment to break out beyond Phase Line Oxalic on the morning of 24 October. During the first half-hour, the surviving Shermans and Grants expended nearly all of their high explosive rounds against infantry, trucks and antitank guns (the latter being particularly difficult to spot), with little but moral effect. The surviving tanks remained forward to provide antitank support to the New Zealand Infantry, losing two Shermans and about three Grants to increasing antitank gunfire.<sup>176</sup> Later that morning on top of the ridge, Brigadier Kippenberger found Brigadier John Currie looking at ten tanks of the Royal Wiltshire Yeomanry Regiment from his 9<sup>th</sup> Armoured Brigade. Brigadier Kippenberger said, *"They had pressed forward and had been disabled on still another minefield. After consolidation he had resumed command of his regiments. John Currie, who was later killed in Normandy, was a most fearless character, and he kept me with him for a quarter of an hour in full view while he watched the damaged tanks, a hundred yards away, being shelled by 88's."*<sup>177</sup>

**6.4.5.3.2. ROYAL WARWICKSHIRE YEOMANRY REGIMENT.** Trooper J. M. "Maxie" Day, driving a Sherman in 2<sup>nd</sup> Troop, B Squadron, described the advance by the main body of Lieutenant-Colonel Guy



Jackson's Royal Warwickshire Yeomanry Regiment, in the 6<sup>th</sup> Brigade zone, where the heavy squadrons advanced along Route 'B' toward Phase Line Oxalic. *"We moved forward through the gun positions, soon after the artillery barrage had opened up, observing strict radio silence. In no time at all it was like a thick peasouper and the only thing visible was the backside of the tank immediately in front. The wireless silence was suddenly broken by 'Charlie Two, Charlie Two, I have lost the column.' This was our Troop officer in the tank in front of us. The Colonel came on the air and ordered him to catch up as quickly as possible since the rest of the squadron was behind him. The Troop Officer suddenly halted his tank, jumped out and ran to an officer by some artillery to ask him the direction. He jumped back into his tank and hared off so hard that I lost him in the dust. I put my foot down on the throttle and caught up with him so quickly that I went straight into his backside, fortunately only pushing in a wing."*<sup>178</sup> They reached the eastern slope of the ridge by 0400.<sup>179</sup>

In attempting to pick their way slowly through the maze of obstacles, the scattered, random antitank mines proved to be more of a problem, than the large, predictable minefields. With the 25<sup>th</sup> Infantry Battalion failing to take its objective on Phase Line Oxalic, the Royal Warwickshire Yeomanry Regiment was forced to shift from Route 'B' to the right and use Route 'A' through the 26<sup>th</sup> Infantry Battalion's sector to reach Miteiriya Ridge. Additional delays occurred when, as described earlier, both the tanks of the Royal Warwickshire Yeomanry Regiment and the 26<sup>th</sup> Infantry Battalion's transport group, under Major McQuade, attempted to pass through the same breach on Route 'A' through the second Axis minefield.<sup>180</sup> As the Royal Warwickshire Yeomanry Regiment crested the ridge, they found the 25<sup>th</sup> Infantry Battalion slightly to their left, on the eastside of Miteiriya Ridge, and A Company of the 26<sup>th</sup> Infantry Battalion about 500 meters to their right. As they continued to advance, apparently in an attempt to reach the New Zealanders of the 26<sup>th</sup> Infantry Battalion, on the exposed, forward slope of Miteiriya Ridge, they unexpectedly encountered a third, unbreached, Axis minefield extending across their front. Trooper Day described this action, *"We were now amongst a mixed column of New Zealanders including 6 pounder anti-tank guns (apparently from the 33<sup>rd</sup> Battery, 7<sup>th</sup> Anti-Tank Artillery Regiment), picking our way through the minefield, when through the thick fog of swirling sand I suddenly spotted an anti-tank gun slewed on one side of the track. A New Zealander near the gun frantically waved his hat, I swerved to miss him, there was a bloody great flash and the New Zealander floated through the air over the gun. The tank seemed to lift off the ground about six feet and clouds of dust filled the inside. The offside track had been blown off by a mine. I got out with the Tank Commander to see what we could do for the New Zealander-the rubber off the tank track had pitted his face like shrapnel. We found a medical orderly in the column and then went back to see what could be done about the tank. By this time there were some five or six tanks in an area of 70 yards or so with tracks blown off. It was about 0300 or 0400 hours and showing signs of getting light. Since none of us could get going without some repairs to tracks someone suggested we utilise all available tracks to get two or three of the tanks serviceable."*<sup>181</sup> In this move forward, with B Squadron in the lead, they lost 6 Shermans (out of 13 assigned) on mines. Elsewhere, as stated earlier, three Crusader tanks from A Squadron of the Royal Warwickshire Yeomanry Regiment, had managed to reach C Company, of the 26<sup>th</sup> Infantry Battalion, on that battalion's right flank, leaving four of their number disabled in the last Axis minefield. These Crusaders arrived soon after dawn and attracted heavy Axis fire. Soon, one was hit and the other two then withdrew to the shelter of Miteiriya Ridge. This last Axis minefield caused the rest of 'B' and 'C' Squadrons to withdraw and take up positions, just before dawn, behind the ridge, on the right of the 25<sup>th</sup> Infantry Battalion but behind the 26<sup>th</sup> Infantry Battalion.<sup>182</sup>

The tanks of the trailing 3<sup>rd</sup> Hussars Regiment of the 9<sup>th</sup> Armoured Brigade also appeared in this area, but a little later, and were then placed in reserve behind the 24<sup>th</sup> Infantry Battalion where they were heavily shelled at 0630. They dispersed and later moved on to the ridge, on the right of the Royal Warwickshire Yeomanry Regiment behind the 22<sup>nd</sup> Infantry Battalion (in the 5<sup>th</sup> Brigade sector).<sup>183</sup>

The small delays in breaching the first two Axis minefields and the traffic jams that resulted from trying to move too many vehicles forward through the narrow lanes meant that General Montgomery's tanks were silhouetted against the increasing light of the eastern horizon, as they attempted to cross over the crest of Miteiriya Ridge. This made them easy targets for Axis tankers and antitank gunners in the area. The unexpected last Axis minefield, covered by effective fire from the Axis forces west of Miteiriya Ridge had prevented Brigadier Currie's tanks from continuing to advance.

#### 6.4.5.4. BRITISH 10<sup>th</sup> ARMoured DIVISION

**6.4.5.4.1. ROYAL ENGINEERS ON BOAT AND INK TRACKS.**<sup>184</sup> The men of Major Moore's 3<sup>rd</sup> Field Squadron, having completed their breaches through the first Axis minefield across Boat and Ink tracks at around 0100, had hurried forward to the next Axis minefield.<sup>1</sup> During this advance, the sappers on 'Boat' had to move without their destroyed 'Pilot' vehicle. When Major Moore, moving ahead of his main body, reached the eastern slope of Miteiriya Ridge where it crossed Boat Track, he met Lieutenant van Grutten as the lieutenant returned from his reconnaissance to the far side of the next Axis minefield (Map 12, location 9). According to Major Moore, Lieutenant van Grutten reported, *"that he had erected the blue light at the far end of the minefield, but that he and his party had had to crawl all the way back as there were quite a number of enemy machine gun posts on the other side of the minefield."* At this point, Major Moore described his actions, *"However, the near edge of the enemy minefield was clearly below the crest on our side and I left instructions to get started while I went to try and find the local New Zealand Company Commander's Headquarters. In this, I was quite unsuccessful. I found a platoon just on the edge of the ridge whose members were in great heart and ready to give us covering fire and I was able to tell them what we were trying to do. They had, in fact, halted temporarily. This New Zealand infantry platoon was most likely from either C or B companies of the 26<sup>th</sup> Infantry Battalion."*

At about 0100, to the right of Major Moore, on Ink Track, Lieutenant Jarvis and his five sappers had moved forward with Captain Awarau's Maoris of C Company, 28<sup>th</sup> Infantry Battalion. Seeing the flares ahead, the lieutenant hoped that these were success signals from the New Zealanders and that his sappers' reconnaissance mission would now be less dangerous. As they worked their way through the halted Maoris of the 28<sup>th</sup> Infantry Battalion and then the 26<sup>th</sup> Infantry Battalion (who were apparently waiting for their fourteen minute artillery prep of their final objective to be completed at 0154), it seemed to Lieutenant Jarvis that the New Zealanders had taken their final objective and were consolidating. However, upon reaching the foremost position of the New Zealand infantry, Lieutenant Jarvis realized that the next Axis minefield, which they had to reconnoiter, was still in 'no-man's land,' just beyond where the New Zealanders had stopped. Moving forward, the sapper reconnaissance party finally located the near side of the last Axis minefield. In this area, it ran along Miteiriya Ridge, with its leading edge just reaching over onto the eastern side of the crest. This edge was marked only with a single strand of barbed wire.

Lieutenant Jarvis had not anticipated such a situation and was unsure what to do next. However, about this time, Major Moore showed up, to the lieutenant's great relief. Quickly assessing the situation, Major Moore told the lieutenant to, *"Get on with it!"* Moving up to the minefield, the sapper reconnaissance party placed a blue light to mark the near side edge of the minefield. Then, accompanied by Major Moore, they proceeded into the minefield, where they found S-mines and British-made antitank mines. During this reconnaissance, Major Moore saw a covered approach in the form of a tongue of low ground as a possible alternate route. As he crawled to the flank to investigate, he was saved by the alertness of Lieutenant Jarvis who stopped him from putting his hand down on the deadly prongs of a waiting S-mine. Major Moore observed, *"The Germans had obviously thought of this approach too, and we abandoned the idea. When they finally reached the far side of the minefield, they put down the second blue light to mark this edge."*

While the reconnaissance party was on the far side of the minefield, a platoon of New Zealanders attacked across the minefield and reached their final objective. In the process, they knocked out a German machine gun that had been firing in the direction of the sappers. However, in this courageous action, the New Zealanders suffered several casualties, including their platoon leader (apparently Lieutenant Ramsay) who was 'gut-shot' and had to be evacuated. As Lieutenant Jarvis and his five man reconnaissance party returned to the near side of the minefield, the breaching team on Ink Track, under Lieutenant Jimmy Hague, arrived at the edge of this last Axis minefield. Although there was quite a bit of yellow tracer fire, the Germans in this area were mostly firing too high. Immediately after the breaching team reached the minefield, the taping party of four sappers, tied together with eight feet between them and with white engineer tape unreeling from racks on their backs and, moved toward the reconnaissance team's first blue light. Then they entered the minefield and crossed over to the second blue light. The rest of the taping party, who pinned down the engineer tape, closely followed them. Next, the two breaching

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<sup>1</sup> Although only the second Axis minefield encountered by Major Moore's sappers, this was in fact the same minefield as the third Axis minefield encountered by the sappers of the 6<sup>th</sup> New Zealand Brigade. The Royal Engineers on Boat Track were far enough to the right that they missed the minefield that ran along the northwest edge of Mine Box K, thus, the British Royal Engineers were now well ahead of the New Zealand counterparts to their left.



parties, each with three mine detectors, entered the minefield where they swept and marked the individual mines. After the mines were found, they were disarmed in the dark and set off to the side.<sup>185</sup>

After returning to the near side of the minefield on Ink Track, Major Moore decided to walk back over to Boat Track to check on the progress of the breach there. While Major Moore had been over on Ink Track, at about 0130, the breach force on 'Boat' had reached the last Axis minefield. Major Moore noted, *"I went back to Boat gap and found them having a very rough time indeed, in spite of a brilliant little action by a New Zealand Infantry Section. My recollection is hazy at this point, but Captain Leese was firmly in control of the situation, and Sergeant Stanton was a tower of strength. It was in some cases necessary to operate the detectors crouching or kneeling to let the tracer go harmlessly overhead."*

As the breach force worked their way across the crest of Miteiriya Ridge, they moved forward into the thick of the still raging night battle. The din increased as the Rheinlanders replied to the New Zealand assault with increasing vigor. The Royal Engineers saw an increasing number of dead Germans and New Zealanders as they advanced as well as a number of wounded waiting anxiously for help to come. This last Axis minefield seemed to be much more thickly sown than the first.<sup>i</sup> It also contained more booby-trapped Italian Red Devil hand grenades and the deadly S-mines, which seemed to be found wherever there was dead ground. As Major Moore's breaching teams crossed the crest of Miteiriya Ridge, fire from the Rheinlanders of the II Battalion, 382<sup>nd</sup> Grenadier Regiment (with about 600 men equipped with nine heavy machine guns and twenty-seven light machine guns) increased in intensity and the sappers' casualties grew. All their expertise and all their coolness were called for as the sappers disarmed the infernal machines in the dark, following the precise drill that they had been taught and trying to make themselves insensitive to the chaos around them. It took cold courage for the mine detector operators to stay standing up as everyone else was either lying down or running. During this breach, two of the 3<sup>rd</sup> Field Squadron's mine detector operators were hit one after the other, but on both occasions Sergeant Stanton took their place and continued the work until a replacement could come forward. Soon, the British Royal Engineers had caught up with the leading New Zealand infantry, probably from the 26<sup>th</sup> Infantry Battalion who had launched their final assault at 0155 to secure their objective along Phase Line Oxalic, just beyond the crest of the Miteiriya Ridge. At times, the sappers were working ahead of the 26<sup>th</sup> Infantry Battalion and within 200 meters of the harassed but as yet unbroken Rheinlanders. Indeed, when driver Flinn had asked a New Zealander for directions to the location of the sappers, as he drove the supply truck forward, he was told, *"The mad bastards are way ahead."*

During this breach, Major Moore felt the need for an infantry security force, under his control, to protect his sappers most keenly. Several German machine guns were now firing at his team from both flanks and although most of the bullets were whistling overhead, a German heavy machine gun opened accurate fire from only sixty meters away on the right. It quickly became difficult to make progress, for any movement brought immediate fire. Major Moore was about to send back for his reserve troop to attack the position, when a New Zealand officer, seeing their predicament, attacked the position with two of his men and, amid an eruption of bursting grenades, killed or captured every man in the post. With the destruction of this machine gun nest, the breach along Boat Track was able to proceed without significant opposition.

With the imminent completion of the breaches, Major Moore attempted to notify his superior, Lieutenant-Colonel McMeekan, *"I remember going back to my control vehicle behind the ridge, and finding a field telephone on which I tried to talk to the CRE."* Failing at this, he was forced to dispatch his squadron sergeant-major in a Daimler Armoured Car back down Boat Track with the good news.

While the 3<sup>rd</sup> Field Squadron was sweeping its way through this last Axis minefield, Lieutenant-Colonel McMeekan had finished sorting things out at the breaches through the first Axis minefield across Boat and Ink tracks. As he was preparing to move forward again, he had directed some of his small reserve from Major Carr's 141<sup>st</sup> Field Park Squadron to stay and widen these two breaches. However, at about this time, Sergeant-Major Booth from Major Moore's squadron unexpectedly appeared out of the gloom on foot. He reported to Lieutenant-Colonel McMeekan that he had been sent back in a Dingo (Daimler Armoured Car) with a progress report, but on the way back between the two Axis minefields, his Dingo had run over a stray mine and been blown up (Map 12, location ⑤). The loss of Sapper Shaw's pilot vehicle earlier in the evening was now making itself felt. The lack of a

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<sup>i</sup> Interestingly, this does not agree with the *panzerarmee's* obstacle reports, which indicate that this particular minefield had only half the normal density of mines.



pilot vehicle meant that Boat Track between the two Axis minefields was not be proofed by the 3<sup>rd</sup> Field Squadron as they moved up. Assessing the situation, Lieutenant-Colonel McMeekan believed that there were probably more randomly scattered antitank mines between these two main Axis minefields. Consequently, he felt compelled to employ his last reserves to locate and clear these scattered antitank mines.

About the same time, Lieutenant van Grutten came back to report to the 10<sup>th</sup> Armoured Division Chief of Royal Engineers that he had been through to Phase Line Oxalic just beyond the ridge, ahead of the New Zealand infantry at about 0200. Lieutenant-Colonel McMeekan then was driven forward in his Humber armored car, while Lieutenant van Grutten and Sergeant-Major Booth clung to the outside. His Intelligence Officer, Lieutenant Alesworth, followed behind in the heavily sandbagged jeep, with Driver Crump at the wheel. On the way forward, Lieutenant-Colonel McMeekan stopped to pick up a corporal who had moved Major Moore's wounded off of Boat Track, along which the tanks were expected to move in the very near future. Moving forward again, they soon passed by the wreck of Sergeant-Major Booth's Dingo. As they approached Miteiriya Ridge, Lieutenant-Colonel McMeekan was standing up in the turret of the armored car as the other three sappers still clung to the outside of it. However, about a kilometer short of the crest of Miteiriya Ridge, a stray shell burst within a few meters of them. As a result, the corporal was badly wounded, while Lieutenant-Colonel McMeekan was shocked by the concussion. With his right eardrum ruptured and the ear bleeding, a tremendous roaring filled his head, which felt like it was about to explode. There was also a small wound to his right arm. Some New Zealand infantry, probably from the 24<sup>th</sup> Infantry Battalion, came up and applied dressings to both men. For a while, Lieutenant-Colonel McMeekan sat on the ground and put his head between his knees. In a minute or two, after he felt better, he remounted his armored car, which was, surprisingly, undamaged and continued the drive toward the crest of the ridge.

Approaching the Miteiriya Ridge, the intensity of the shelling increased considerably and many dead bodies could be seen strewn over the low rocky slope. Once on the ridge, Lieutenant-Colonel McMeekan found Major Moore's few vehicles (now only two or three at most) tucked in behind a bank that ran along the crest of the ridge. Major Moore himself arrived very soon thereafter and reported that both of his breaches, 'Boat' and 'Ink' just to the north, were making good progress. At this point, his sappers were not far behind time and his teams were, in fact, in front of the New Zealand infantry. It was now 0330 (Z plus five hours and fifty minutes) and the rifle companies of the New Zealand 26<sup>th</sup> Infantry Battalion after having exploited up to 650 meters beyond the last Axis minefield, had consolidated their objectives on Phase Line Oxalic about 400 meters beyond the last Axis minefield. In about thirty minutes, at 0400, Brigadier Custance's 8<sup>th</sup> Armoured Brigade was due to start its passage of lines through the 2<sup>nd</sup> New Zealand Division. The urgency of the situation pressed hard upon the two officers. Soon, a report by field telephone came from Major Brinsmead, commanding the 573<sup>rd</sup> Army Field Company that the breach on Bottle Track to the north, was through the last Axis minefield, in the 5<sup>th</sup> New Zealand Brigade's sector. However, no progress reports had been received yet from Major Yeates and his 571<sup>st</sup> Field Company. These sappers were responsible for Hat Track, the southernmost route of the 10<sup>th</sup> Armoured Division in the 6<sup>th</sup> New Zealand Brigade zone. So Lieutenant-Colonel McMeekan set out to learn the situation for himself there and transferred from the armored car to his faster sandbagged jeep (however, this vehicle had no radio).

**6.4.5.4.2. BRITISH ROYAL ENGINEERS ON HAT TRACK.** The sappers (from Devon and Cornwall Major Yeates' 571<sup>st</sup> Army Field Company on Hat Track) were delayed by an unexpected Axis minefield (apparently the one which formed the northwest edge of Mine Box K) between the two main minefields. In addition, Lance-Corporal Harold Greatrex had been wounded when his pilot vehicle blew up, apparently on a mine (Map 12, location ⑨). Nevertheless, refusing first aid, the corporal proceeded to unload the breaching team's supplies from the immobilized pilot vehicle and carry them forward to the sappers, now some 250 meters ahead of him. He made four trips through the Axis barrage before he completed this task.<sup>186</sup> In addition to the delays caused by this unexpected Axis minefield, an Italian machine gun nest, probably manned by the 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment, had been missed in the darkness by the first wave of New Zealand riflemen. To meet this new threat, Major Yeates deployed some sappers from his breaching team. They were preparing to assault this position when the Maoris of D Company, 28<sup>th</sup> Infantry Battalion arrived and forced the nest to surrender, capturing three prisoners and seven machine guns (as described earlier). In the meantime, Major Yeates' sapper reconnaissance party under Lieutenant Herbert Darwell had reached Miteiriya Ridge and, at around 0300, had located a gap left by the *panzerarmee* through the last Axis minefield. However, since this gap was on the wrong bearing, the reconnaissance party chose to cross the minefield on the correct bearing, while marking both the near and far sides of the minefield with a blue light.

After the return of the reconnaissance party to the near side of the minefield, apparently, the lieutenant had walked back to report his findings to the breaching team and Major Yeates. While he was away, Lieutenant-Colonel McMeekan, now almost deaf, drove himself and Driver Crump toward Hat Track. However, they had not gone far when he failed to hear a Maori's challenge to stop and a bayonet flashed menacingly against the side of the jeep. With this, he decided to change places with Driver Crump. Another hundred meters on, another party of Maoris, apparently from D Company, 28<sup>th</sup> Infantry Battalion yelled at them. Driver Crump said to Lieutenant-Colonel McMeekan, "*They say we've run into a minefield, Sir.*" Lieutenant-Colonel McMeekan then dismounted and found a wire wrapped around the rear axle of his jeep. It was a near thing, but as the two fortunate men bent over to remove the wire, Lieutenant-Colonel McMeekan saw, to his delight, a German skull-and-cross-bones sign with the warning "*Achtung Minen*" painted on it. By sheer luck, they had stumbled into the *panzerarmee*'s own gap through this minefield. This was the same gap found earlier, but ignored, by the reconnaissance party from the 571<sup>st</sup> Army Field Company on Hat Track.

Indeed, close by, Lieutenant-Colonel McMeekan found a part of that reconnaissance party, consisting of about six sappers under the command of a sergeant. From the sergeant, Lieutenant-Colonel McMeekan learned that the reconnaissance party, led with great daring by Lieutenant Darwell, had been through to their objective beyond Miteiriya Ridge. There, they had put down their guiding blue lights and returned to the near side of the last Axis minefield. Now, they were waiting for the breaching team to work their way forward to them. At this point, Lieutenant-Colonel McMeekan realized that the 25<sup>th</sup> Infantry Battalion of the 6<sup>th</sup> New Zealand Brigade was out of position and had not reached their objectives along Phase Line Oxalic. He knew that there was no Allied infantry ahead of them and that his sappers were now the leading troops in this area. Nevertheless, there was still just enough time to clear the way for the armor if the existing Axis gap was a safe one. He decided to check it with the reconnaissance party. This small party had with them one of the locally produced South African mine detectors mounted on bicycle wheels, which they called a 'pram.' Drafting his driver Crump into the small reconnaissance team, Lieutenant-Colonel McMeekan set off toward the crest of Miteiriya Ridge and the main defensive positions of the Sicilians of III Battalion, 61<sup>st</sup> Infantry Regiment on the reverse slope. While two sappers operated the 'pram,' Lieutenant-Colonel McMeekan and three others split up along either side and moved forward as the detector advanced, looking for any fresh marks in the sand that might show where the Axis engineers had closed this lane at the last minute. These six sappers were now ahead of the whole 8<sup>th</sup> Army in this area, strolling slowly along, eyes glued to the moonlit ground.

Apparently, the local Axis commander, Captain Attilio Caimi commanding the III Battalion, 61<sup>st</sup> Infantry Regiment, was also uncertain of the situation in the darkness. With about 350 men equipped with six heavy machine guns, eighteen light machine guns, and four 81mm mortars, the Sicilians were maintaining a curtain of desultory shell and machine gun fire along western side of the ridge. Driven forward by the urgency of the situation, the little sapper reconnaissance party paid no heed to the fire, but Lieutenant-Colonel McMeekan was careful to keep a man close by his less deaf car. However, Lieutenant-Colonel McMeekan's luck did not last long. About 150 meters beyond the crest of Miteiriya Ridge, two Italian machine guns opened up about 200 meters to their left, their tracers flicking just over the heads of the sappers, narrowly missing. The reconnaissance party quickly dropped to the ground as Lieutenant-Colonel McMeekan made a quick assessment of the situation. Although he considered attempting to complete this reconnaissance by crawling forward, his watch showed him that it was already 0430 (Map 12, location ⑤). There was simply no time left to complete this breach. With three of the 10<sup>th</sup> Armoured Division's breaches swept and a fourth clear to the crest of Miteiriya Ridge, he decided that it was time to call the waiting tanks of Brigadier Custance's 8<sup>th</sup> Armoured Brigade forward. With the roaring in his head now forgotten, he felt that all of Africa was within his grasp if the tanks could be guided through the breaches within an hour. With his little team, he crawled back across the crest of the ridge as fast as he could and moved to the opening of the gap through the last Axis minefield.

Climbing into his jeep, he hurried back toward Boat Track by moving across less than 300 meters of uncleared ground along the eastern slope of Miteiriya Ridge that separated Hat and Boat tracks, accepting the risk of running over a mine. Soon, he reached Boat Track, where he had left his armored car, and attempted to call the armor forward by radio. However, both the radio set and its operator had been badly shaken when he landed on top of them after having been blown into the air when the armored car was shelled. Lieutenant-Colonel McMeekan was extremely frustrated by the fact that the whole plan might fail because of a single faulty radio. He quickly jumped back into his jeep and drove as fast as he dared back down Boat Track where he found that the 8<sup>th</sup> Armoured Brigade was already rumbling forward. He shouted to the first squadron leader, Major Christopherson, riding a

Crusader from A Squadron of the Sherwood Rangers Regiment that the way was clear. Then, close behind, he found Brigadier Neville Custance, the brigade commander. After listening to a quick report from Lieutenant-Colonel McMeekan, the brigadier told him that Lieutenant-Colonel H. E. 'Pete' Pyman's 3<sup>rd</sup> Battalion, Royal Tank Regiment on Hat Track had finally gotten through the unexpected Axis minefield and were now even with him. However, Lieutenant-Colonel Pyman did not know what was in front of him. Knowing that the 3<sup>rd</sup> Battalion, Royal Tank Regiment would have to use the gap left by the Axis in order to get through the last Axis minefield, Lieutenant-Colonel McMeekan said, *"Very well, Sir, I will go over and guide them."*

Lieutenant-Colonel McMeekan took his jeep and made his second trip over to Hat Track, again moving diagonally cross-country between the two tracks, worried the whole way about the chances of striking a mine. Lieutenant-Colonel McMeekan described his journey, *"Foolishly I neglected to take a compass bearing, thinking I could keep my direction from the setting moon. But the ground was broken with trenches, wire and gun-pits, and although we only had 300 yds. to go, I suddenly felt lost, until I saw two glows-rising sun and setting moon. I suppose I was a bit hazy; anyway it seemed ages till I located the tanks, which had halted."*

*To my disgust they said they had orders to halt. This was in accordance with the Army Commander's policy, which forbade rash attacks by tanks through defiles in the face of enemy artillery. But in my impatience it seemed folly to lose the chance before sunrise."* Thus, Hat Track was not used by the 10<sup>th</sup> Armoured Division to reach Phase Line Oxalic on the morning of 24 October.

**6.4.5.4.3. SHERWOOD RANGERS REGIMENT ON BOAT AND INK TRACKS.** While Lieutenant-Colonel McMeekan had been trying to get the Hat Track opened up to Phase Line Oxalic, the sappers of the 3<sup>rd</sup> Field Squadron had been 'working like demons' to complete their breaches through the last Axis minefield across Boat and Ink tracks. Major Moore, like his Chief of Royal Engineers, was getting more anxious about the time. A hard driver in training and in action, he encouraged and guided his sappers. He always tried to be at the place where he was most needed. Before long, as already stated, his sappers were ahead of the New Zealand infantry. They worked steadily under continuous fire from the German grenadiers as they crept forward, sweeping, marking, lifting, and taping. It was now getting on towards 0600 (Z plus eight hours and twenty minutes) and the eastern sky was beginning to change from black to gray as the stars faded. Major Moore described the progress of his two breaches under these difficult circumstances; *"There was nothing for it but to press on. This we did on Boat and Ink gaps, but the work was very slow. Corporal Herring was fatally hit and several sappers were wounded. Eventually we found indications that we had reached the far side of the minefield. The blue light had long since been shot away. As Sergeant Stanton was hammering in the last of the mine markers in an 8yd gap, I ran through the gap in a tearing hurry. There were by my estimate less than 20 minutes left before dawn would break..."* Over on Ink Track, at about the same time, the sound of hammers on metal rang out into the night as the marking party drove its pickets into the hard ground and placed their lights on them. Looking at the handiwork of the sappers after it was finished, Lieutenant Jarvis said that it was a remarkable sight on Miteiriya Ridge as it looked like *"a seaside pier, with green lights inside and amber on the outside."*<sup>187</sup>

From the entrance to the breach, over the crest of Miteiriya Ridge, in the expanse between the two Axis minefields, Major Moore could see the tanks of Lieutenant-Colonel 'Flash' Kellett's Sherwood Rangers Regiment lined up, nose to tail, waiting for the word to go forward. Major Moore ran back to the first tanks, the nine Crusaders of A Squadron. Jumping on to the lead tank, he shouted to the officer (probably Lieutenant Garret) in the turret, *"For God's sake, get up as quickly as you can, or you'll run into trouble."*

The tanks of the Sherwood Rangers Regiment moved out immediately, with Major Moore leading them forward. Soon, they climbed up the low rocky slope and came over the crest of Miteiriya Ridge. Major Moore could see Sergeant Stanton standing at the head of one of the only two breaches across this last Axis minefield through the 6<sup>th</sup> New Zealand Brigade sector, in the dawn twilight, waving them on. They answered his signal and as the Crusaders deployed from the opening of the breach, their black shapes became silhouetted in the dull gray light. According to the operations order for Lightfoot, the armor of X Corps was supposed to be on Phase Line Pierson at dawn.

Almost immediately, there was a terrible 'clang' as an armor-piercing round struck the lead Crusader that Major Moore was guiding forward (Map 12, location ⑥). A few hundred meters beyond, was the main defensive position of *Hauptmann Krupfganz*' battalion supported by a screen of dug-in antitank guns (this battalion was assigned five 5cm PAK 38s and four 3.7cm PAK36s, however, at least one antitank gun had been lost with the



combat outpost line).<sup>1</sup> Major Moore at once ran back to the next tank in the line and guided it around the first. Within a few meters of the first tank, it suffered the same fate. He ran back for a third, with the same result. Major Moore described the action; *"I remember six tanks deploying left and right at the end of the gap engaging some enemy antitank guns with their Besas (machine guns). By this time it was getting light and I remember how odd a coloured light looked in the grey dawn."* To their right, a few other tanks were able to use the other open breach through this last Axis minefield on Ink Track.

After suppressing the antitank guns near the exit from the breach, the tanks of Lieutenant-Colonel 'Flash' Kellett's Sherwood Rangers Regiment slowly advanced about 1500 meters beyond the last Axis minefield, overrunning the main defensive area of the II Battalion, 382<sup>nd</sup> Grenadier Regiment. Squadron A continued to lead the regiment, followed by the Grants of B Squadron. As the regiment was planning to turn south, suddenly a number of German antitank and machine guns opened up, some as close as fifty meters. These were part of the reserve company of the II Battalion, 382<sup>nd</sup> Grenadier Regiment, which appears to have been deployed two up and one back. The Crusaders of A Squadron had no choice but to continue their advance. They were now in the midst of the dug-in antitank guns of the German grenadiers. Now that the German *panzerjaegers* were beginning to see their targets more clearly, it became very dangerous for the tankers. Indeed, in the first five minutes of this action, six tanks from the Sherwood Rangers Regiment were hit and burning. Of the six remaining Crusaders, soon two more were hit, with the squadron claiming two German tanks knocked out (although these tanks could have been from the I Battalion, 8<sup>th</sup> Panzer Regiment, it seems more likely that these were Italian M14s from the XII Battalion, 133<sup>rd</sup> Armored Regiment). The twenty Grants of B Squadron followed close behind the Crusaders into the heavy fire, quickly losing four tanks. At this point, the rest of the regiment, including the Shermans of C Squadron, was still jammed up nose-to-tail behind them in the long, narrow breaches over the crest of the ridge as the eastern sky behind them continued to brighten. Lieutenant-Colonel Kellett now ordered the surviving Grants of B Squadron to form a double column on either side of him and to engage the German *panzerjaegers*. While the better armored Grants provided covering fire, the rest of the regiment attempted to turn around where they were in the 8-yard (7.3-meter) wide breaches in the minefield and withdraw back behind the shelter of Miteiriya Ridge. In the increasing light, three more Crusaders and four more Grants were soon knocked out. The crews of these tanks were machine gunned as they attempted to flee their stricken mounts. Soon, the markers put up by the sappers had been knocked down by the shellfire, so that other tanks, trying to deploy to a flank, drove into the Axis minefield.<sup>188</sup>

Faced with this situation, Lieutenant-Colonel Kellett tried to call forward the machine gunners of 'The Buffs,' (1<sup>st</sup> Battalion, Royal East Kent Regiment) who formed part of his Sherwood Rangers regimental group, to suppress the *panzerjaegers*. However, he could get no answer from them on the radio. Next, he summoned his field gunner, Major David Egerton, commanding B Battery, 1<sup>st</sup> Royal Horse Artillery Regiment, whose OP (Observation Post) tank, a Stuart, was next to his own in the column. Could he, Lieutenant-Colonel Kellett asked, do anything about those 'chaps' to the front? As Major Egerton, a young Regular Army officer, looked west through his spectacles into the pre-dawn, it was still too dark to discern anything but solid, black objects at a distance. The intimidating streams of red tracers from the German 5 cm PAK 38s continued to weave their intricate patterns all around, and the flames of the burning tanks glowed on either side. However, all that he could see ahead were the flashes from the German guns, dug in on the reverse slope in a slight fold in the ground, a few hundred meters away. Having assessed the situation, he said to Lieutenant-Colonel Kellett, *"I don't think I can do any good, Sir, but I'll have a try."*

He quickly called his battery into action. However, the 25-pounders were still stuck in the long column jammed up along Boat Track, between the tanks of B and C squadrons from the Sherwood Rangers Regiment. Within the narrow confines of the 8-yard (7.3-meter) wide minefield breach, it was impossible for the guns to deploy properly. Captain Peter Jackson, commanding the 'gun group,' without hesitation, decided that the only direction to go was forward. Pulling the eight 25-pounders of the two troops out of line, he led them through the minefield. He deployed them in a 'crash action' in the open some 300 meters beyond the last Axis minefield (about 1,200 meters behind the regiment's leading elements). His Downham Troop deployed to the right, while the Sahagon Troop deployed to the left. It was reminiscent of a horse artillery action in the old tradition, in front of most

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<sup>1</sup> However, recall that at least one of these antitank guns had been stationed in the combat outpost line and captured by D Company 28<sup>th</sup> Infantry Battalion earlier in the evening (see section 6.3.3.3.).

of the regiment. They were so close to some of the Rheinlanders that a 5cm PAK 38 antitank gun had to be attacked and silenced by Lieutenant Pat Grant with hand grenades.

The two troops immediately opened direct fire over open sights, but the only targets they could see to engage were the momentary flashes against the still gloomy western horizon from unseen, well-concealed weapons. These, as Major Egerton knew, were poor targets for his guns. At this time, it was impossible to observe the fall of shot and adjust the fire of the guns. However, the shapes of his guns, now dimly silhouetted against the eastern horizon, were more clearly revealed, as the eastern sky grew lighter. The guns quickly came under accurate heavy fire, from antitank guns, machine guns and rifles, but the gunners resolutely continued to serve their pieces. Major Egerton's own Stuart tank, 200 meters ahead, was soon hit. Deprived of mobility and communications, he had to walk back to his battery through the storm of steel. Once there, he found that both of his gun troops were suffering heavy casualties, with men seeming to drop at the guns every minute. Nevertheless, the gunners continued to serve their 25-pounders, and here and there the flashes of the German guns seemed to diminish, nevertheless, the *panzerjaegers* could not be fully suppressed. The approaching dawn, however, brought an end to the gallant little action. Seeing the tanks of the Sherwood Rangers Regiment beginning to withdraw back down 'Boat' and 'Ink' to the cover of the ridge, Major Egerton gave the order, "*Cease firing; prepare to withdraw.*"

With that, the hump-backed 'quads' drove up in the dissipating gloom, led by their troop-sergeants with the steadiness of a peacetime battle-drill. Their distinctive shapes, familiar to the Germans from many previous actions, brought a new intensity to their fire. However, the quads drove on, wheeled right and left to their troops, hooked up to their guns and drove back, very fortunate that only one of them was knocked out. Some twenty wounded from the battery still lay out on the forward slope of Miteiriya Ridge and had to be picked up and evacuated. Lieutenant David Mann, leader of the Downham Troop, began to do so, but was soon mortally wounded. Lieutenant Jack Tirrell, leader of the Sahagon Troop, formerly an enlisted man, who already wore the ribbons of the Military Cross and Distinguished Conduct Medal, had better luck and got his wounded out, piled high on his Stuart tank. Now, it was almost full daylight and, as the crimson dawn of the rising sun glowed behind the rocky crest of Miteiriya, the funeral pyres of the smoking tanks were dyed a blood red. After all of his men had cleared the battery position, Major Egerton and his remaining officers walked quietly away in the morning light and, as they did so, Captain Jackson was wounded by a 5 cm shell that burst between him and the major.

Protected by the remaining tanks of A and B squadrons, the 1<sup>st</sup> Royal Horse Artillery Regiment was able to withdraw behind the ridge. After the rest of the Sherwood Rangers Regiment had reached the comparative safety of the eastern side of the ridge, Lieutenant-Colonel Kellett ordered his remaining tanks in A and B squadrons (now with no more than one Crusader and twelve Grants operational) to withdraw. Fortunately, in the increasing light, they were able to pick their way through gaps left by the Germans in the last Axis minefield and take up defensive positions along the ridge.<sup>189</sup>

At about the same time, Lieutenant-Colonel McMeekan had returned to Boat Track, intent on urging the armor to hasten forward before first light. He soon found an artillery officer and asked to use of his radio to speak to Brigadier Custance's brigade headquarters. The gunner demanded to see his identity card and Lieutenant-Colonel McMeekan produced it, chafing at the delay. A few seconds later, another artilleryman asked for it, and the card fell from Lieutenant-Colonel McMeekan's hand, which was quivering with anger and impatience. Then, Lieutenant-Colonel Douglas Packard, commanding the 1<sup>st</sup> Royal Horse Artillery Regiment, whose guns were coming into action under shellfire just behind, turned up and took the irate, determined and almost stone-deaf Chief of Royal Engineers to see Brigadier Custance personally.

Meanwhile, Major Moore and his sappers, their primary mission complete, had occupied some German trenches, and were preparing to help the New Zealand infantry repel the expected German counterattack. To Driver Flinn, who was perhaps the first man to drive a vehicle over the crest of the ridge, this was the worst part of the night, but he drew comfort from the nonchalance and dry humor of Corporal Delve. At about this time, the *Luftwaffe* made its first appearance in the battle with an attack by a Ju-87 Stuka. This attack passed almost unnoticed by the Royal Engineers, for, as Flinn observed, a couple of dozen bombs in the middle of that maelstrom meant nothing. Major Moore continued his description of the battle, "*I decided that I must collect our men and get them behind the ridge. We could see no indication of scattered mines beyond the gap, although events the next night proved that there were some.*"



*Leaving a party the unenviable task of keeping the gap marking signs in order we withdrew behind the crest and brewed up some breakfast...*

*After a quick meal we were glad to welcome our transport, and the Squadron set to work to do any necessary widening of gaps in the first minefield... ” It had taken the Royal Engineers of the 3<sup>rd</sup> Field Squadron from about 0130 to 0600 to breach the last Axis minefield across Boat Track under fire. Although this was an incredible technical achievement, Major Moore felt that they had failed - they had been too late, half an hour too late.*

At about 0630, Lieutenant-Colonel Pyman's 3<sup>rd</sup> Battalion, Royal Tank Regiment, now redeployed from Hat to Boat Track, started to push over the top of the ridge. Sergeant Kite of the regiment, described the scene on the approach to Miteiriya Ridge, *“Some tanks veered off the paths cleared by the Sappers and their tracks were blown off. Crews jumped out and set off anti-personnel mines and there was chaos. We could go neither forward nor back. Through all the bangs and shouting I could hear the sound of bagpipes as the Highland Division tried to push over the ridge. We were ordered to stay in our tanks and stand turret watch. We had to look out for an enemy counter-attack. What with the rum, the noise and the excitement, it was all you could do to keep your eyes open. As it began to get light I could see tanks everywhere, quite a few of them crippled and preventing the movement of others.”*<sup>190</sup>

At about 0800, Lieutenant-Colonel McMeekan ordered Major Moore's 3<sup>rd</sup> Field Squadron to withdraw to the original no-man's-land and prepare for operations on the next night. Flinn drove some of them back a couple of kilometers or so in his Chevrolet. He then made two further trips up to collect the wounded, bringing back New Zealanders and British alike, several of them badly burned tankers, from the Sherwood Rangers Regiment. The sappers' two minefield breaches, now revealed to the German grenadiers, were quickly placed under observed fire. Soon, a long-range duel between the British tankers, now deployed along the crest of Miteiriya Ridge, and the defenders began. Dirty, tired, and thirsty, Major Moore's 3<sup>rd</sup> Field Squadron withdrew full of pride that they had done their job. Their training had been so good that they had not suffered a single casualty from mines; nor, indeed, had any other Royal Engineer unit in the 10<sup>th</sup> Armoured Division. Nevertheless, the Royal Engineers of the 10<sup>th</sup> Armoured Division had successfully completed three of their four breaches through all of the Axis minefields and on to Phase Line Oxalic. Further back, Major Carr and his sappers had finished widening and marking Boat Track through the first Axis minefield. The sappers relaxed and began to brew up for breakfast. However, as Sergeant Stanton took off his steel helmet, a shell burst about sixty meters away and a splinter from it embedded itself in his skull.

**6.4.5.5. 4<sup>th</sup> FIELD REGIMENT.**<sup>191</sup> With the completion of the preplanned artillery barrage, the 4<sup>th</sup> Field Regiment reverted to the control of the 9<sup>th</sup> Armoured Brigade. Despite the success of the initial attack, there was to be no rest for New Zealanders of the 4<sup>th</sup> Field Regiment. Their next task was to displace forward, with the 31<sup>st</sup> Anti-Tank Battery, in support of Brigadier Currie's 9<sup>th</sup> Armoured Brigade as it attempted to push beyond Phase Line Oxalic toward Phase Line Pierson to exploit the success of the sappers and the New Zealand infantry. Brigadier Currie had been most anxious that these field guns should be in close support, at dawn on 24 October and that their forward observers should be forward with the tanks. He had not been satisfied with the co-operation between the 4<sup>th</sup> Field Regiment, the New Zealand Chief of Royal Artillery, and his own staff to ensure that this would happen.<sup>1</sup> He had been led to believe that the 4<sup>th</sup> Field Regiment observation posts, which operated in White armored cars or Stuart tanks, would meet his regiments on the Qattara Track and go forward with them. Brigadier Weir, the New Zealand Division Chief of Royal Artillery, had said nothing to the contrary when the two had met on the morning of 23 October. It was not until Brigadier Currie had returned to his own headquarters that he learned that this was no longer intended. General Freyberg, commander of the 2<sup>nd</sup> New Zealand Division, entirely agreed that the armored observation posts should go forward as Brigadier Currie proposed and instructed his division artillery headquarters accordingly (in the absence of Colonel Weir). However, General Freyberg was reluctant to send the other soft-skinned vehicles of the 4<sup>th</sup> Field Artillery Regiment forward of Miteiriya Ridge at first light, as Brigadier Currie seemed to wish. He also promised that the guns would go forward, as soon as possible. The misunderstanding seems to have arisen from a discussion between Brigadier Weir and Lieutenant-Colonel Stewart of the 4<sup>th</sup> Field Regiment in which the latter took mere suggestions related to certain contingencies to be firm orders. This was soon

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<sup>1</sup> Brigadier Currie had been concerned enough to write a letter on 23 October to General Freyberg. In it, he pointed out that he had been an artilleryman for 27 years, a regimental commander in Operation Crusader, and a Chief of Royal Artillery since then, *“so I do think I can be trusted not to throw my guns away.”*



corrected as Brigadier Weir ordered the observation posts to do as Brigadier Currie directed and further instructed the 5<sup>th</sup> and 6<sup>th</sup> field regiments to do all they could to support the 9<sup>th</sup> Armoured Brigade on 24 October.

Because of this embarrassing confusion, the New Zealanders of 4<sup>th</sup> Field Regiment were more determined than ever to fulfill their support role satisfactorily. Their “Quads” (prime movers) came forward, at the earliest possible moment, after their lifting barrage had ceased, even though traffic congestion delayed them a little, and the 25-pounders were hooked up. They had barely begun to move, before 0300, when they were suddenly ordered back into action and field telephone lines had to be hurriedly re-laid. The emergency—probably in the area of a flanking division—soon passed and the 4<sup>th</sup> Field Regiment moved on, though at an irritatingly slow pace because of the mass of vehicles attempting to press forward through the narrow minefield breaches. In the breaches, the gunners saw several vehicles of other units that had been blown up on mines. They themselves kept closely to the tracks and suffered no harm. By an extraordinary effort, the ground ahead was reconnoitered and Lieutenant-Colonel Stewart got his guns deployed before dawn at the eastern foot of Miteiriya Ridge, well inside a forward portion of the II Battalion, 382<sup>nd</sup> Grenadier Regiment’s former main defensive position. All of the armored observation posts were sent forward with the leading tanks of the 9<sup>th</sup> Armoured Brigade. The unarmored ones followed at first light. These were soon engaging hostile batteries beyond the ridge, as well as Axis infantry, which were still holding up the advance of the 1<sup>st</sup> South African Division to the south.

At dawn in their new positions, the gunners found they that had occupied an area thickly sown with Tellermine and booby traps. Some of these booby traps included heavy aircraft bombs fuzed to explode by trip wire. Indeed, three men were killed and another wounded when a signals truck (from Section E of the 2<sup>nd</sup> New Zealand Division’s signals unit) supporting the 4<sup>th</sup> Field Regiment, detonated an improvised explosive device that consisted of a 44 gallon drum packed with explosives and connected to a tripwire.<sup>192</sup>

#### 6.4.6. DEUTCH-ITALIENISCHEN PANZERARMEE BEGINS TO REACT.

On the Axis side of the battle, by 0300, generals Stumme, von Thoma, and Lungerhausen still had not determined if the engagement currently underway was a major attack or just a strong reconnaissance-in-force. Nevertheless, a critical situation was developing along their main line of resistance as Brigadier Kippenberger’s 5<sup>th</sup> New Zealand Brigade, assisted by 37 tanks from the Royal Wiltshire Yeomanry Regiment, had overwhelmed the remnants of Captain Manassei’s II Battalion, 62<sup>nd</sup> Infantry Regiment as they took their final objectives on Phase Line Oxalic at around 0400. The apparent destruction of this battalion left elements of *Oberst Teege’s Kampfgruppe Sud* (II Battalion, 115<sup>th</sup> Panzer Grenadier Regiment and the Italian XII Battalion, 133<sup>rd</sup> Tank Regiment), in the second line of defense, to halt the Allied advance and seal this penetration. In fact, one company of the II Battalion, 62<sup>nd</sup> Infantry Regiment did continue to resist for some time. In the adjacent southern sector, *Hauptmann Krupfganz’s* unit continued to resist despite heavy losses. His outpost unit, the 7<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment had been overrun. The tanks of the Sherwood Rangers Regiment had largely overrun his main battle position earlier in the morning. However, the Sherwood Rangers Regiment, by 0800, had been forced to withdraw because of the fire of antitank guns of *Hauptmann Krupfganz’s* reserve, the 9<sup>th</sup> Company (as discussed earlier). The grenadier company (the 6<sup>th</sup> or the 8<sup>th</sup>) deployed on his left in the main battle area had been lost about 150 men captured (by the New Zealand 22<sup>nd</sup> Infantry Battalion). The battalion’s equipment losses included at least eight machine guns and two antitank guns.<sup>193</sup> To the north of the Italian II Battalion, 62<sup>nd</sup> Infantry Regiment, the men of the III Battalion, 382<sup>nd</sup> Grenadier Regiment were also continuing to hold their own. Nevertheless, it was uncertain how long these two German battalions could continue to withstand the pressure. Consequently, *General der Kavallerie* Stumme (through General Gloria, commanding XXI Corps) directed General Masina, Commander of the 102<sup>nd</sup> Trento Division, to commit his reserve, the II Battalion, 61<sup>st</sup> Infantry from its position in the second echelon in front of the New Zealand 6<sup>th</sup> Brigade to the threatened sector and counterattack at dawn.<sup>194</sup>

*Leutnant* Bernard Orth of the 1<sup>st</sup> Battery, I Battalion, 33<sup>rd</sup> Panzer Artillery Regiment was part of *Oberst Willi Teege’s Kampfgruppe Sud*. Standing in his armored observation truck, the *leutnant* raised his field glasses to his eyes as the early morning sun broke through the battlefield haze at about 0600. To his horror, he saw that some of the Italian infantry (probably from Captain Manassei’s II Battalion, 62<sup>nd</sup> Infantry Regiment) from the 102<sup>nd</sup> Trento Division was in flight. “*Front kaput! Front kaput!*” They screamed as they fled to the west. Behind the stragglers, the first British tanks appeared, at a range of about 3000 meters. They were brand new American-built Shermans and Grants. These were the tanks of A and C Squadrons of Lieutenant-Colonel Peter Sykes’ Royal Wiltshire Yeomanry Regiment that had penetrated west from Miteiriya Ridge, following the lanes cleared by the

New Zealand sappers of Major Skinner's 8<sup>th</sup> Field Company.<sup>195</sup> This British regiment, which had begun the operation with 37 tanks, was now reduced to about 12 mobile Shermans and Grants. These were supported by fire from many of the 20 or so tanks that had been immobilized by mines while crossing Miteiriya Ridge. The warning, "*Enemy armor advancing!*" went out over the radio. The hour had arrived for the field artillery to hold the line. The gunners on the four 10.5 cm le FH18s were well trained and soon, most of the tanks were knocked out as the armored spearhead of Operation Lightfoot came to a halt about 250 meters beyond the front of the New Zealanders of the 22<sup>nd</sup> Infantry Battalion. Shifting fire, the German gunners engaged the tanks immobilized by mines, destroying many of them.<sup>196</sup>

At 0630, *General der Kavallerie* Stumme directed the 133<sup>rd</sup> *Littorio* Armored Division to support the counterattack of the 15<sup>th</sup> Panzer Division, which he had directed to begin at dawn.<sup>197</sup> Ten minutes later, at 0640, *Generalmajor* von Vaerst, commanding the 15<sup>th</sup> Panzer Division, ordered *Hauptmann* Hinrichs to move his 33<sup>rd</sup> Panzer Pioneer Battalion to the southern flank of the III Battalion, 115<sup>th</sup> Panzer Grenadier Regiment (of *Kampfgruppe Mitte*, (Battlegroup Center)): "*Mission: Defend against any enemy attacks.*"<sup>198</sup>

## 6.5. SITUATION, DAWN, SATURDAY, 24 OCTOBER

### 6.5.1. 6<sup>th</sup> NEW ZEALAND BRIGADE SECTOR

At about 0400 (Z plus six hours and twenty minutes), Brigadier Gentry left his initial position on the line of departure and moved forward to Miteiriya Ridge in a tank from the Royal Warwickshire Yeomanry Regiment. That morning, he found his forward infantry battalions (25<sup>th</sup> and 26<sup>th</sup>) had consolidated their positions and established contact with the 1<sup>st</sup> South African Division on their left and the 5<sup>th</sup> Brigade on their right. However, the brigade had taken half of its final objectives, on the left, Lieutenant-Colonel Bonifant's 25<sup>th</sup> Infantry Battalion had stopped short due to a navigational error (Map 14). As his infantry 'hunkered down,' their heavy weapons were still struggling forward in an attempt to support them against the expected Axis counterattacks.<sup>199</sup>

However, owing to delays caused by the deep Axis minefields and the resulting traffic congestion, very few of the 6th Brigade's antitank guns were in position on Miteiriya Ridge as dawn broke. Indeed, the commander's jeep of L Troop, 33<sup>rd</sup> Anti-Tank Battery, 7<sup>th</sup> Anti-Tank Regiment had blown up on a mine while evacuating wounded infantry. Also, some of the gunners of the 33<sup>rd</sup> Anti-Tank Battery had difficulty getting their 6-pounder antitank guns forward on to the 6<sup>th</sup> Brigade's objective on the exposed western slope of Miteiriya Ridge. The profusion of mines made it dangerous indeed to drive *portees* (an antitank gun mounted in the bed of a truck) and emplace guns there. In addition, two L Troop *portees* had broken down during the move forward. These were soon repaired and driven forward at first light. Troop L did manage to dig in along the crest of the ridge in support of Lieutenant-Colonel Fountaine's 26<sup>th</sup> Infantry Battalion. The *portees* of the 31<sup>st</sup> Anti-Tank Battery, 7<sup>th</sup> Anti-Tank Regiment, which were also in the area, drove forward with Brigadier Currie's armor, ate breakfast near the eastern foot of the ridge, moved forward again, and dug-in their 6-pounders. Many of the antitank guns were soon in position and had suffered remarkably few losses.<sup>200</sup>

By daybreak, many of the machine gunners of the 27<sup>th</sup> Machine Gun Battalion were also in position to support their infantry. No. 7 Machine Gun Platoon was deployed to support the 25<sup>th</sup> Infantry Battalion by indirect fire<sup>i</sup> from the exposed left flank, while No. 8 and No. 9 Machine Gun Platoons on the right, between the 25<sup>th</sup> and 26<sup>th</sup> infantry battalions, provided critical support that helped secure the brigade front. Lieutenant Gardiner of No. 8 Machine Gun Platoon described the situation, "*We arrived at our likely position later than expected. Dawn had broken. As a result we were under fire—M.G. shell etc. —and had to get below ground as soon as possible. I was instructed to cover the (Axis) minefield and take up a forward position in the (550-meter) gap between 25 & 26 Bns. A quick recce showed a position on the crest and of course just our side of Miteiriya Ridge.*

*I instructed the lads where to put the guns & they needed no urging to get the holes dug. While this was going on I moved out forward to find out what I could i.e. who were on flanks, fields of fire etc., and in lieu of a Tommy Gun which I did not have, took a rifle and bayonet. Huns were here & there in odd shell holes but they had*

<sup>i</sup> Although this technique is largely neglected by the US Army at present, it is technically possible to do this with tripod mounted machine guns using the traverse and elevating mechanism.

*no fight left in them & and were sheltering as much as possible from their own fire being on the forward slope. With the stuff floating about it was difficult to get them out of the holes—to say nothing of language difficulties. However they seemed to understand a few well known Australian adjectives and once on their feet, I had to run to keep up with them as they soon appreciated the fact that it was much safer on our side of Miteiriya Ridge than the exposed side.” Lieutenant Gardiner brought back five prisoners.<sup>201</sup>*

The 34 surviving tanks (7 Shermans, 14 Grants and 11 Crusaders) of Lieutenant-Colonel Guy Jackson’s Royal Warwickshire Yeomanry Regiment completed their deployment in hull-down positions behind the ridge at about this time. They would remain there all day (Photo 76).<sup>202</sup>

While the rest of the brigade consolidated on the final objective, A and B Companies of the 24<sup>th</sup> Infantry Battalion redeployed to their correct positions on the intermediate objective, while C Company moved to its proper position in support. They were to be prepared to operate as the 6<sup>th</sup> Brigade’s reserve. At dawn, Captain Yeoman, commander of C Company, made a reconnaissance of the area and discovered that his men had occupied a mixed minefield of antitank mines and improvised explosive devices. Lieutenant Ramsay, Leader, 14<sup>th</sup> Platoon said, “During that recce we followed Captain Yeoman walking about over the minefield, and it was not until a Carrier Corporal was blown up a hundred yards in front of us that we decided to take precautions. At the OC’s request we did not commence digging until the engineers had had a day to clear most of the mines (Photo 77) and set off the booby traps. It was not until we inspected the effect of these booby traps that we realized what might have happened! Some of them were made from a combination of teller-mine and captured British 500-pound bombs. One crater was 3 meters across.”<sup>203</sup>



**PHOTO 76. Grants and Shermans of C Squadron, Royal Warwickshire Yeomanry Regiment, in the 6th New Zealand Brigade Sector, Afternoon, 24 October**

The Maoris of C and D companies, 28<sup>th</sup> Infantry Battalion, after the 6th Brigade had released them, moved back to Phase Line Red and rejoined their parent battalion. Once there, they were to form part of the 2<sup>nd</sup> New Zealand Division’s reserve.<sup>203</sup>

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<sup>i</sup> Later, during the day, Lieutenant-Colonel Fred Hanson’s sappers came to clear the 24<sup>th</sup> Infantry Battalion’s company areas of mines. It was not until this task was accomplished that this infantry would begin the work of digging in.



The estimated losses (Table 25) for the 6<sup>th</sup> Brigade, up to this point, were at least 47 killed out of 264 casualties (9.8% of assigned strength). So far, the total casualties in Lieutenant-Colonel F. J. Gwilliam's 24<sup>th</sup> Infantry Battalion were eight killed and 72 wounded—a fairly high proportion (12.3% of assigned strength) considering the fact that the battalion had been 180 below strength before going into action. Among the wounded were second-lieutenants Butler and Rawson of A and B companies.<sup>204</sup> Lieutenant-Colonel Ian Bonifant's 25<sup>th</sup> Infantry Battalion had about 40 casualties, including 10 killed (5.2% of assigned strength). By 1000, Lieutenant-Colonel Fountaine's 26<sup>th</sup> Infantry Battalion, deployed on the exposed western slope of Miteiriya Ridge, had suffered about 90 casualties (11% of their initial strength), including 24 killed. Company A had lost nine killed and 22 wounded. Lieutenant Harvey, the only platoon leader left in the company, had been wounded. Non-commissioned officers were now in charge of the three line platoons. Company B reported four killed, including its sergeant major, and 14 wounded. Company C had lost 15 men, and the battalion headquarters was operating twelve short. The battalion's specialist sections and platoons had also lost twelve men, including two officers. By midday, the total casualties in the battalion exceeded 100. The Maoris of Lieutenant-Colonel Baker's 28<sup>th</sup> Infantry Battalion had lost 6 killed (1 officer and 5 other ranks), 53 wounded (3 officers and 50 other ranks), and 3 other ranks missing. Thirty-seven of these losses appear to have occurred in the 6<sup>th</sup> Brigade zone (mostly in D Company).<sup>205</sup> As usual for engineers conducting a breach under fire, the sapper's casualty rate was comparable to that of some infantry units. Mines, including half of their assigned Crusader tanks, had caused almost all of the brigade's equipment losses up to this point. In exchange, within the brigade's zone the 8<sup>th</sup> Army had captured about at least ten Germans and seven Italians with at least another two Germans killed. In addition, at least ten machine guns and two German antitank guns had been captured or knocked out in the same period. Not included in these numbers are several prisoners, antitank guns and "Spandau" machine guns captured intact by the 26<sup>th</sup> Infantry Battalion near Miteiriya Ridge.

**TABLE 25. 6<sup>th</sup> BRIGADE CASUALTIES, EARLY MORNING, 24 OCTOBER**

Unit	Strength	Killed	Wounded	Total	Equipment
24 <sup>th</sup> Battalion	648	8 (1.2%)	72 (11.1%)	80 (12.3%)	
25 <sup>th</sup> Battalion*	765	10 (1.3%)	12 (1.6%)	40 (5.2%)	1 carrier (mine), 1 Scorpion (breakdown)
26 <sup>th</sup> Battalion**	765	24 (3.1%)	66 (8.6%)	90 (11.7%)	3 Crusaders (mines), 3 carriers (mines), 2 Scorpions (stuck), 1 Jeep (mine), 2-pdr AT gun (gunfire)
28 <sup>th</sup> Battalion***	210			37 (17.6%)	
8 <sup>th</sup> Field Company	307	5 (1.6%)	12 (3.9%)	17 (5.5%)	1 Jeep (mine)
Total	2695	47 (1.7%)	162 (6.0%)	264 (9.8%)	3 Crusaders (mines), 4 carriers (mines), 3 Scorpions (breakdown and stuck), 2 Jeep (mines)

\* Partial listing, losses for B Company were 'considerable' but not specified

\*\* As of 1000 hours 24 October

\*\*\* A specific break out of casualties for the Maoris supporting 6<sup>th</sup> Brigade (companies C and D) is not available, however, it would appear that most of these casualties occurred in D Company, the strength given in this table is estimated for just C and D companies.

### 6.5.2. BRITISH 8<sup>th</sup> AND 9<sup>th</sup> ARMoured BRIGADES

At dawn, two of the three armored regiments of Brigadier Currie's 9<sup>th</sup> Armoured Brigade were deployed along Miteiriya Ridge. However, these two regiments had suffered significant losses (39 out of the 81 tanks (48%) with which they had begun the operation had been knocked out). In the 5<sup>th</sup> Brigade sector, the Royal Wiltshire Yeomanry Regiment had taken the heaviest casualties in their attempted breakout, losing 26 of the 37 tanks with which they began the operation. In the 6<sup>th</sup> Brigade sector, Lieutenant-Colonel Guy Jackson's Royal Warwickshire Yeomanry Regiment had taken fewer, though still significant, casualties (losing 13 of the 44 tanks (30%) with which they began the operation) and was now deployed in hull down positions near the right flank of the 25<sup>th</sup> Infantry Battalion. The 3<sup>rd</sup> Hussars Regiment had not yet been committed. After 0630, it deployed behind the 5<sup>th</sup> Brigade's 22<sup>nd</sup> Infantry Battalion (Table 26). Axis laid mines had accounted for at least 33 of the 39 tank casualties (Photo 78) in the 9<sup>th</sup> Armoured Brigade. Although most of these were initially recoverable, many of those immobilized were on the forward slope of Miteiriya Ridge and were subsequently hit and set ablaze by Axis tanks and antitank gunfire, thus completely destroying many of these vehicles.<sup>206</sup>





**TABLE 26. 9<sup>th</sup> ARMoured BRIGADE CASUALTIES, EARLY MORNING, 24 OCTOBER**

Unit	Tank Strength	Mines*	Gunfire *	Remarks
Royal Warwickshire Yeomanry	44	12(?) (27%)	1 (2%)	
A Squadron (Crusader)	13	6(?) (35%)	1 (6%)	Including detachments to the 6 <sup>th</sup> New Zealand Brigade
B Squadron (Shermans)	14	6 (46%)		
C Squadron (Grants)	17			Not committed beyond Miteiriya Ridge
Royal Wiltshire Yeomanry	37	21 (57%)	5 (14%)	10 killed, 32 wounded by noon
A Squadron (Shermans)	10	6 (60%)	2 (20%)	1 Scout car lost (mine), 3 more Shermans knocked out by gunfire by noon
B Squadron (Crusader)	14	5 (?) (36%)		Including detachments to the 5 <sup>th</sup> New Zealand Brigade
C Squadron (Grants)	13	10 (77%)	3 (30%)	
3 <sup>rd</sup> Hussars	37			In reserve, not yet committed
Shermans	12			
Grants	9			
Crusader	16			
Brigade Total	122	33 (27%)	6 (5%)	Includes 4 tanks with Bde HQs
Shermans	66	12 (18%)	2 (3%)	
Grants	37	10 (27%)	3 (8%)	
Crusader	49	11 (22%)	1 (2%)	37 Mk IIs, 12 Mk IIIs

\* Percentages are in reference to initial strength.

The regiments of Brigadier Custance's 8<sup>th</sup> Armoured Brigade, because of difficult traffic conditions, had been forced to advance in an uncoordinated manner and at different times because of the various completion times of their breaches. When they finally arrived at the crest of Miteiriya Ridge, they found more minefields and scattered mines. In the 5<sup>th</sup> Brigade's sector, the Staffordshire Yeomanry Regiment had moved down Bottle Track with sixteen Crusaders and twenty-seven medium tanks. These arrived after the withdrawal of the Royal Wiltshire Yeomanry Regiment. After losing five Crusaders to mines and four more to antitank guns, they took up positions on the eastern side of Miteiriya Ridge.<sup>207</sup> The Sherwood Rangers Regiment, coming down Boat Track (in the center of the division zone), as stated earlier, had emerged near the left flank of the 26<sup>th</sup> Infantry Battalion and encountered sustained antitank fire from the II Battalion, 382<sup>nd</sup> Grenadier Regiment and the III Battalion, 61<sup>st</sup> Infantry. In the increasing light, this fire knocked out 8 Crusaders and 8 Grants. Fighting 'tank pure,' the armored regiments of the 8<sup>th</sup> Armoured Brigade lacked the infantry support necessary to suppress the well-concealed antitank guns of the grenadiers and the *Bersaglieri*.<sup>208</sup> As a result of this determined resistance the advance of the Sherwood Rangers Regiment had been stopped and the regiment withdrew behind the ridge.

Major Moore had these comments about the work of the Royal Engineers, "*We had breached the minefields as ordered, but that first night had been just not long enough. Whether another hour would have given the armour a clear run, I don't honestly know... In fact, we had failed. We Sappers of Boat route had done our part, but we had not done it in time. I often consider how we could have done better. I think I was obsessed with getting Boat gap through against opposition. We might have done better to concentrate all of our resources on guiding the armour over to Bottle and Ink gaps. On the other hand I was very much less happy about the presence of scattered mines beyond those gaps, and side-stepping two armoured columns in the middle of the night was an extremely difficult and risky operation, and would have been a complete departure from the prearranged plan with all the dangers that it involved.*

*From my little view of the operation, what we needed was infantry ready to hand to deal with the opposition that had been holding up our work... Above all, we had heeded better communications system than one major on his feet. Whilst I had been able to control my sappers without difficulty, arrangements for reporting back, calling support and calling up the army had left much to be desired.*

The cost to the division's sappers on Boat Track had also been considerable. Major Moore's 3<sup>rd</sup> Field Squadron had suffered 20 wounded and 5 killed on the first night alone, out of a deployed strength of about 150 men (17%), the two army field companies (the 571<sup>st</sup> and the 573<sup>rd</sup>) had only suffered about fifteen casualties between them.<sup>209</sup> The 3<sup>rd</sup> Battalion, Royal Tank Regiment, which had attempted to move up on Hat Track, had finally switched to 'Boat.' At about 0630, the Crusader and Grant Squadrons of the 3<sup>rd</sup> Battalion, Royal Tank Regiment pushed on to the ridge and took up positions with the Sherwood Rangers Regiment on their right.<sup>210</sup> The rest of the battalion took up positions behind the 25<sup>th</sup> Infantry Battalion. With the completion of their deployment along Miteiriya Ridge, the 8<sup>th</sup> Armoured Brigade had lost 25 of the 133 tanks (19%) with which they had begun the



operation. At about this time, the Royal Dragoons Regiment attempted to push out patrols of armored cars (from 'C' Squadron) to the south. This troop moved over the ridge and immediately came under fire from an antitank gun, which knocked out two of the armored cars before fire from the troop leader's vehicle knocked it out. With the loss of another on a mine, they were ordered to withdraw. However, B Squadron was able to patrol the gap between the 8<sup>th</sup> and 24<sup>th</sup> armoured brigades.<sup>211</sup>

### 6.5.3. 2<sup>nd</sup> NEW ZEALAND DIVISION SECTOR

By dawn, the situation on the 2<sup>nd</sup> New Zealand Division's front was satisfactory, from General Freyberg's point of view (Map 14). The typical rifle battalion had started the attack with a strength of about 35 officers and 730 enlisted, of these, more than half (15 officers and 328 enlisted) were in the "tail." This meant that the typical New Zealand rifle company began the attack with only about 5 officers and 100 enlisted men. Considering that about ninety percent of the division's total casualties occurred in the rifle companies, by the time they reached the division's final objectives along Phase Line Oxalic, most of the rifle companies had been reduced to 50-60 men. Based on this, there were approximately 770 riflemen on the ridge with which to cover a frontage of about 5.1 kilometers (one rifleman for every 6.6 meters). Brigadier Kippenberger, commanding the 5<sup>th</sup> Brigade, believed that this was adequate for defense, which was primarily a matter of manning guns and automatic weapons, but that nothing less than 80 men per company was sufficient to continue the attack.<sup>212</sup> All of the division's objectives had been taken, except on the left where Lieutenant-Colonel Bonifant's 25<sup>th</sup> Infantry Battalion, due to a navigational error, was still about 700 meters short of Phase Line Oxalic.

In addition, Lieutenant-Colonel Hanson's New Zealand sappers and Lieutenant-Colonel McMeekan's Royal Engineers were the only ones in their respective corps with most their breach lanes cleared right up to their lead formations. On four lanes, the engineers in the 2<sup>nd</sup> New Zealand Division zone, on Phase Line Oxalic were ready for the armor to pass through to their intermediate objectives along Phase Line Pierson. On the other tank corridor, the northern one, the infantry themselves had been brought to a halt well short of Phase Line Oxalic. This successful mine breaching in the 2<sup>nd</sup> New Zealand Division zone, under fire at night in the smoke and dust of a desert battle had demonstrated the importance of intensive training, rigorous planning, and determined sappers inspired with the doctrine that while one sapper lived, the mine clearing would go on (see Appendix K for a summarized chronology of events in the 6<sup>th</sup> New Zealand Brigade Zone). In fact, all through the hectic night, the 2<sup>nd</sup> New Zealand Division's Chief of Royal Engineers, Lieutenant-Colonel Frederick Hanson, with his staff officers and a South African liaison officer had moved about the battlefield noting the progress of the mine breaching and sending reports back to the division's headquarters.<sup>213</sup> However, owing to the delays caused by the traffic jams in the 2<sup>nd</sup> New Zealand Division zone and the narrow minefield breaches, very few tanks and antitank guns were in position with the forward infantry battalions at dawn.<sup>214</sup> The following 10<sup>th</sup> Armoured Division had its 8<sup>th</sup> Armoured Brigade just behind Miteiriya Ridge ready to advance; however, there was another, unexpected, belt of mines on the forward slope of Miteiriya Ridge in the 26<sup>th</sup> Infantry Battalion area.<sup>215</sup> As stated earlier, the sappers of Lieutenant Andrews' No. 3 Section were preparing to move over the crest of the ridge and breach it in daylight, when Brigadier Gentry, the 6<sup>th</sup> Brigade commander, stopped them. Nobody would have lived long above ground on that bare slope in daylight. This minefield eventually proved to be much more extensive than originally thought, particularly in the area of C Company, 26<sup>th</sup> Infantry Battalion.<sup>216</sup> Although *Hauptmann* Streitz' men from the 220<sup>th</sup> Pioneer Battalion had taped off a narrow, winding lane through the minefield, for use by dismounted personnel, it was of little use to the British tankers.<sup>217</sup> Nevertheless, Boat and Ink tracks just to the right were open through this last Axis minefield.

The few tanks of the 8<sup>th</sup> and 9<sup>th</sup> Armoured Brigades that had passed through beyond Phase Line Oxalic were later withdrawn. By daybreak, about 120 tanks had moved to within 20 or 30 meters of the crest of the ridge between the 25<sup>th</sup> and 26<sup>th</sup> infantry battalions and had taken up hull down positions from which they engaged any Axis targets that exposed themselves.<sup>218</sup> From General Freyberg's point of view, this was highly satisfactory as it discouraged Axis counterattacks, but unfortunately, the Axis retaliatory fire fell mostly on the New Zealand infantry. For a while, the sector became an inferno. Shells were exploding all over the place, with each one throwing up a large cloud of dust, flame, and smoke. The forward troops had a bad time and suffered some casualties. However, From General Montgomery's point of view, the main concentrations of armor were still on the wrong side of the ridge. They could not exploit the bridgehead that had been made in the Axis defenses because of the breaches through this last Axis minefield were now covered by heavy antitank fire.<sup>219</sup> The New Zealanders dug-in around the ridge did not escape unscathed. In fact, about this time, an air burst over the 26<sup>th</sup> Infantry Battalion Headquarters

wounded seven more of the staff, including the adjutant. Although nobody was killed, four of the men were seriously wounded. After this, to quote the Lieutenant-Colonel Fountaine, "*everyone became a jack of all trades.*"<sup>220</sup>



**PHOTO 77. Cache Point for Tellermine 35s Lifted from a Minefield**



**PHOTO 78. A Crusader Immobilized by a Mine**

The entirety of Lieutenant-Colonel Baker's 28<sup>th</sup> Infantry Battalion, after the release of their rifle companies by brigades, was supposed to relieve the 21<sup>st</sup> Infantry Battalion (5<sup>th</sup> Brigade) and form the division's reserve in the 'lying-up area,' along phase line Red.<sup>221</sup> For various unstated reasons, however, the relief was not accomplished.<sup>222</sup>

During the attack, approximately 277 (41 killed, 236 wounded or missing) of the New Zealanders' casualties had occurred in the first phase of the operation, mainly from antipersonnel mines, mortars and machine guns. During this phase, in which the line of outposts, manned in this zone by the 7<sup>th</sup> Company, 382<sup>nd</sup> Grenadier Regiment, were overrun, C Company, 28<sup>th</sup> Infantry Battalion had captured 4 men, while the 23<sup>rd</sup> Infantry Battalion (5<sup>th</sup> Brigade) captured 50 and killed at least another 8 (photos 79 and 80). In the second phase, the infantry had to assault strongly defended positions and neutralize snipers in the main defensive area. Now, strongpoint after strongpoint had to be taken with the hand grenade and bayonet. In this phase, the division captured most of Miteiriya Ridge in its zone and 288 prisoners (taken almost entirely in the 5<sup>th</sup> Brigade zone), at a cost of about another 627 casualties (including at least 80 killed). The division's surgeons noted that antitank and antipersonnel mines caused a large proportion of the most severe wounds.<sup>223</sup> After the attack, the New Zealand Division reported to XXX Corps that they had taken some 300 prisoners (according to the various infantry battalion unit histories, it would appear that at least 347 prisoners were actually taken, mostly Italians from the II Battalion, 62<sup>nd</sup> Infantry Regiment). In exchange, the New Zealanders reported about 420 wounded or missing in action plus another 41 killed (Table 27) to XXX Corps, out of approximately 900 actually incurred (including about 120 killed). The difference between what was reported and what the units actually had probably reflects both the confusion of battle and the time lag between the combat troops and higher headquarters. In Brigadier Kippenberger's opinion, both the Germans and that in general, the Italians of the 102<sup>nd</sup> *Trento* Division had also resisted stubbornly, at least until the close approach of Allied infantry with the bayonet.<sup>224</sup> As demonstrated by the very small quantity of men and heavy weapons captured or destroyed by the 6<sup>th</sup> Brigade, it would appear that the Rheinlanders of the two forward companies of the II Battalion, 382<sup>nd</sup> Grenadier Regiment had managed to conduct a fairly successful local withdrawal. In the 6<sup>th</sup> Brigade's southern zone, the Italians of the III Battalion, 61<sup>st</sup> Infantry Regiment retained their initial positions in the 25<sup>th</sup> Infantry Battalion's zone (Map 15).



**PHOTO 79. Captured Axis Combat Outpost**





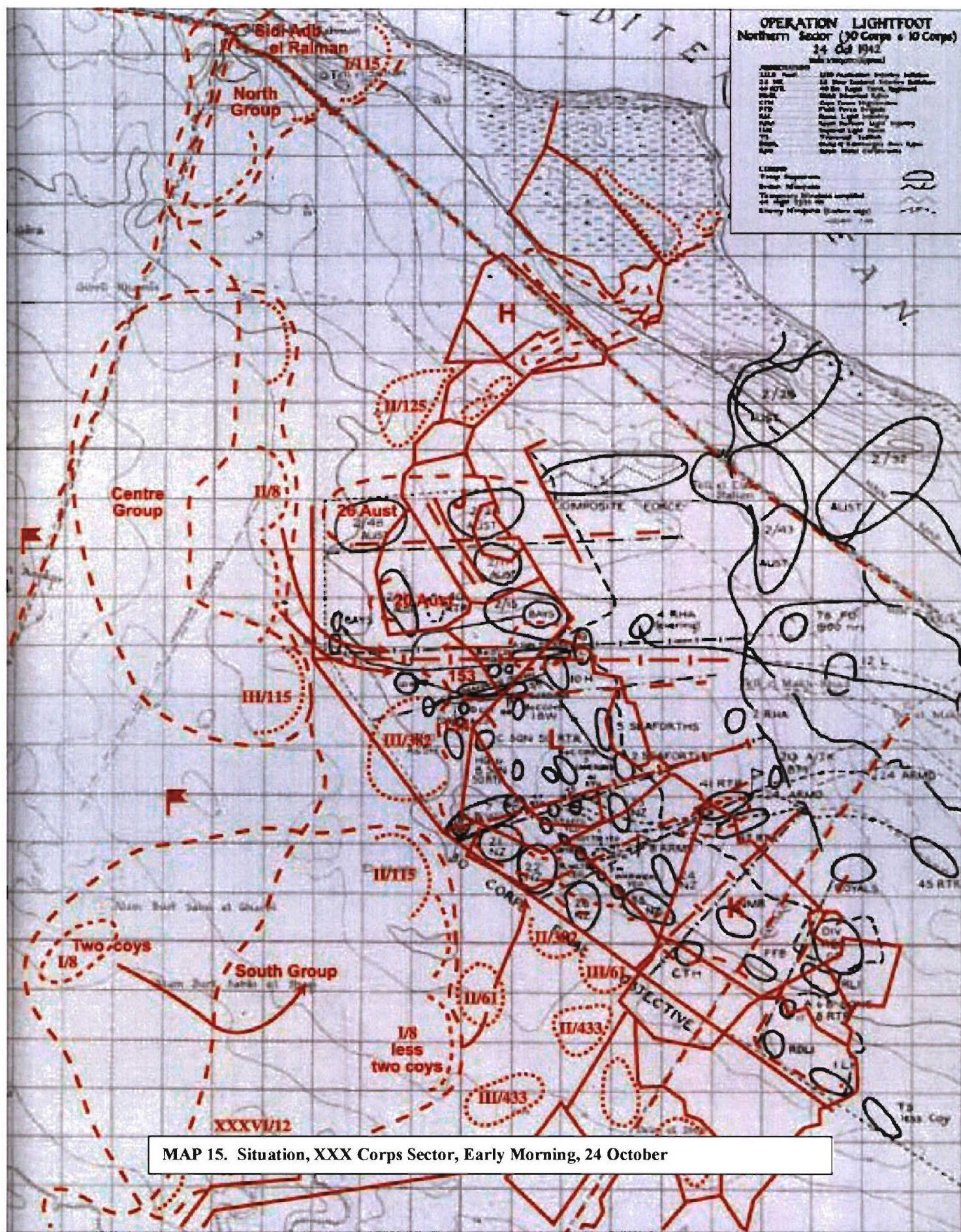
**PHOTO 80. Another Captured Axis Combat Outpost**

**TABLE 27. 2<sup>nd</sup> NEW ZEALAND DIVISION CASUALTIES  
EARLY MORNING, 24 OCTOBER**

Unit	Strength	Killed	Wounded	Total	Equipment/Remarks
5 <sup>th</sup> Brigade	1989 (est.)	58	270*	561	Partial data, not including attachments (sappers, 28 <sup>th</sup> Bn, etc.)
6 <sup>th</sup> Brigade	2178	42	150	210	Not including attachments (sappers, 28 <sup>th</sup> Bn, etc.), 4 carriers (mines), 3 Scorpions (broken down or stuck), 1 Jeep (mine)
9 <sup>th</sup> Armoured Brigade		10	32	42	Partial data, (Royal Wilts. Yeomanry Regiment by noon), 39 tanks knocked out (33 mined, 6 gunfire), 1 scout car (mined)
28 <sup>th</sup> Battalion	650 (est.)	6	56*	62	
Engineers	852	5	24	29	6 Scorpions (3 stuck, 1 mined, 2 broken down), 1 Jeep (mine)
Total	16,000	121	532	904	39 tanks (33 mined, 6 gunfire), 4 carriers (mines), 6 Scorpions (1 mined, 3 broken down, 2 stuck), 2 Jeep (mines), 1 scout car (mined)

\* Includes missing







#### 6.5.4. XXX CORPS SECTOR

The first reports to General Oliver Leese, the XXX Corps Commander, from the battlefield indicated that there had been sufficient initial success everywhere on the corps front to constitute a 'break in' and to open the 'dog-fight' phase of Operation Lightfoot. Nevertheless, the 152<sup>nd</sup> Brigade (51<sup>st</sup> Highland Division) and the 5<sup>th</sup> New Zealand Brigade seemed to be the only ones that had taken all of their objectives. The morning situation map indicated that the 9<sup>th</sup> Australian Division was a little more than halfway, and the right brigade of the 51<sup>st</sup> Highland Division was shown well forward but still short of its final objective. On the left of the 2<sup>nd</sup> New Zealand Division, the 26<sup>th</sup> Infantry Battalion of the 6<sup>th</sup> Brigade had taken their objective but the 25<sup>th</sup> Infantry Battalion, through a navigational error, was 900 meters short of theirs. In reality, the Australians had one brigade on their final objective and one brigade about a thousand meters short. The Highlanders were also held up, in places well short of the objective, although the 7<sup>th</sup> Battalion of the Black Watch Regiment was in contact with the 2<sup>nd</sup> New Zealand Division on their final objective. South of the 2<sup>nd</sup> New Zealand Division, the 2<sup>nd</sup> South African Brigade, on the left of the 25<sup>th</sup> Infantry Battalion, had not reached their final objective, however, further south; the 3<sup>rd</sup> South African Brigade had secured its final objectives (Map 15). In addition, there had been only minor Axis counter-attacks, so far.<sup>225</sup>

Aside from some success in the 5<sup>th</sup> New Zealand Brigade zone and in the XIII Corps zone, the improvised Scorpion flail tanks had not been particularly successful. The old Matilda hulls the engineers were forced to use as the host vehicle broke down frequently, preventing their use. The three assigned to the 9<sup>th</sup> Australian Division were all reported to have overheated early in the operation.<sup>226</sup> Those assigned to the 51<sup>st</sup> Highland Division never reached the breach site,<sup>227</sup> while mines disabled the three assigned to the 1<sup>st</sup> South African Division.<sup>228</sup> In the XIII Corps zone, although mines, gunfire, and breakdowns eventually accounted for all seven flails assigned, one had managed to create a breach about half way through the first mine belt before it was knocked out (Annex 1, Appendix L).<sup>229</sup> However, this one was unfortunately left within reach of Italian patrols from the 185<sup>th</sup> *Folgore* Airborne Division.<sup>230</sup> The pilot vehicles (trucks with improvised mine rollers and sandbag protection) appear to have shown some utility for the 44<sup>th</sup> Infantry Division<sup>231</sup> and the 10<sup>th</sup> Armoured Division,<sup>232</sup> but are rarely mentioned in accounts of the battle. The new mine detectors had also proven to be prone to breakdown. As a result, the sappers were forced to breach most of the minefields by prodding with a bayonet.<sup>233</sup>

In the attack, XXX Corps had taken only 954 prisoners (XIII Corps had reported taking 500 (almost entirely from the 185<sup>th</sup> *Folgore* Airborne Division) for an 8<sup>th</sup> Army total of about 1400). This indicated how thinly held the forward defenses (the combat outpost line) had been. In fact, the attack had not generally penetrated deeply into the main defensive area of the Axis. As the Australian official history stated, "*It had been expected that the 30 Corps objective was west of all enemy minefields and west of his field gun area. In fact hardly a field gun was captured in the 30 Corps attack and at least one minefield was in the area west of the objective.*"<sup>234</sup> In exchange for their gains, the Australians had reported 350 casualties (including 40 killed), the 51<sup>st</sup> Highlanders reported 1000 casualties, the New Zealanders, as mentioned above, 420 wounded or missing plus another 41 killed, and the South Africans reported 350 casualties (including 40 killed). Thus, the total personnel casualties for General Leese's XXX Corps were initially reported to be about 2,000 men, mostly among the infantry.<sup>235</sup> In addition, XXX Corps had also lost at least 40 of the tanks attached to it, mostly to mines.

#### 6.5.5. X CORPS ZONE

In spite of the success of XXX Corps' infantry, in no sector had the armor of X Corps been able to pass through the infantry and exploit at daylight to their objectives on Phase Line Pierson. The Axis minefields had proven to be deeper and more extensive than expected. These caused significant delay. It seemed to the British tankers and senior commanders as though the entire area was one enormous minefield. In the northern sector, the 1<sup>st</sup> Armoured Division could not get through the corridor (along the boundary between the 9<sup>th</sup> Australian and the 51<sup>st</sup> Highland Division's zones) and had failed to reach Phase Line Oxalic. This corridor was still blocked by minefields covered by fire from German strong points manned by *Oberst Hirsch's* 382<sup>nd</sup> Grenadier Regiment. As stated earlier, although the southern corridor through the New Zealand sector was cleared as far as Miteiriya Ridge, the 9<sup>th</sup> Armoured Brigade (still under the 2<sup>nd</sup> New Zealand Division's command), followed closely by the 8<sup>th</sup> Armoured Brigade, had reached the ridge. Many of their tanks had managed to reach the forward slopes of the ridge, but these had suffered heavy casualties and the armored regiments were unable to advance to Phase Line Pierson. At first light, most of the rest of the 10<sup>th</sup> Armoured Division was still well short of Miteiriya Ridge. The location of most of



the 24<sup>th</sup> Armoured Brigade was unknown to the division, its elements were scattered across the original 'no man's land.' However, elements of its 45<sup>th</sup> Battalion, Royal Tank Regiment, from the 24<sup>th</sup> Armoured Brigade, did move to a position where Bottle Track crossed Miteiriya Ridge at dawn. There, A and C squadrons took up positions that overlooked some Axis positions on either side of the track. From this position, C Squadron was able to engage a few targets.<sup>236</sup> The 133<sup>rd</sup> Motorized Infantry Brigade, due to traffic congestion, had not even been able to cross 'no man's land' and was still astride the Red Road, about five kilometers southwest of the railroad station at El Alamein.

The depth of the minefields and the narrowness of the routes through them combined with tough resistance from the Axis forces in their main defensive area west of Miteiriya Ridge meant there was very little room for the follow-on units, causing massive traffic jams. In a British description, "*The congestion was dreadful, and confusion reigned everywhere. One had the impression of being in a poorly organized automobile parking lot during a race meeting in a small and dusty auto racetrack.*"<sup>237</sup> As stated earlier, Phase Line Oxalic was supposed to have been west of all of the minefields and the Axis gun line. It was not. The net result was that neither armoured division of X Corps, on which such high hopes had been placed, was able to break out. Thus, the mine was the weapon that most seriously obstructed the breakout of the 8<sup>th</sup> Army's armor. Some on Miteiriya Ridge, such as Lieutenant-Colonel McMeekan and Major Moore, felt that an extra half-hour of darkness might have done the 'trick' of getting a significant amount of armor over the ridge. However, as demonstrated by the experience of the Royal Wiltshire Yeomanry and the Sherwood Rangers regiments, it is unclear if X Corps' armor could have broken through the next line of Axis defenses, manned by *Oberst* Willi Teege's powerful *Kampfgruppe Sud*, on El Wishka Ridge beyond. All told, X Corps had some 30 to 40 tanks put out of action by Axis tanks, antitank guns, mines and mechanical problems; however, most of these tanks were easily recoverable and repairable. Within X Corps, the 10<sup>th</sup> Armoured Division had lost at least 25 tanks (20% of which were claimed by mines).<sup>238</sup>

#### **6.5.6. JOINTLY HELD SECTOR OF THE 164<sup>th</sup> LEICHT AFRIKA DIVISION AND THE 102<sup>nd</sup> TRENTO DIVISION**

Out on the Miteiriya Ridge that morning, there was a knocked-out Italian tank. Under it, Allied soldiers found two dead Germans who had taken cover there and built a breastwork of ammunition boxes in an attempt to protect themselves from the steel maelstrom. In silent testimony to the severity of the artillery barrage, both soldiers had been killed by fragments that had actually passed between the tank's tracks and road wheels and then through the gaps between the boxes.<sup>239</sup> By dawn, an air of gloom had settled over the sector jointly held by the Italian 102<sup>nd</sup> Trento and the German 164<sup>th</sup> Leicht Afrika divisions. Although the Allied artillery fire had become intermittent as the morning wore on, a ceaseless flow of Axis ambulances and trucks loaded with casualties continued to arrive from the front.<sup>240</sup>

At first, the situation reports reaching General Alessandro Gloria's XXI Corps headquarters, at Tel el Nagharti (fifteen kilometers west of Mine Box H), during the night had been sketchy. These initial reports indicated that several battalions of the Italian 62<sup>nd</sup> Infantry Regiment and the German 382<sup>nd</sup> Grenadier Regiment had been disrupted by the formidable artillery fire of XXX Corps. As time passed, it became apparent that about three hundred tanks and twenty-five battalions of fresh Allied troops had advanced behind a protective curtain of fire along a ten kilometer front, against eleven weak Axis infantry battalions (six German and five Italian). Some of these forward battalions had already suffered heavy losses during the course of the bombardment before they were engaged by the 8<sup>th</sup> Army's infantry and tanks.<sup>i</sup> By about 0330, elements of the XXX Corps had consolidated on Phase Line Oxalic (see Map 13) and, in the process they had dealt the Axis main defensive positions a serious blow. The main defensive area of much of the 102<sup>nd</sup> Trento and 164<sup>th</sup> divisions was seriously weakened and in no condition to withstand another attack.<sup>241</sup> However, the Allies, because of the massive traffic jams caused by the deep Axis minefields and the stiff resistance offered by many of the Axis infantry battalions, could not get enough of X Corps' tanks forward to successfully attack the second line of defense. This position was dug-in along El Wishka Ridge, west of Miteiriya Ridge and manned by elements of the *Generalmajor* von Vaerst's 15<sup>th</sup> Panzer Division and General Bitossi's 133<sup>rd</sup> Littorio Armored Division, formed into the mixed task forces known as *Kampfgruppe Mitte* and *Kampfgruppe Sud*.

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<sup>i</sup> These casualties appear to be, at least in part, a result of inadequate survivability positions. *Alamein, 1933-1962, An Italian Story*, page 213.

By dawn, the 8<sup>th</sup> Army controlled about 55 square kilometers of the “Devil’s Gardens,” including all of Mine Box J as well as most of mine boxes K and L. An estimated 40 tanks (of the 8<sup>th</sup> and 9<sup>th</sup> armoured brigades) had passed through the New Zealand Division and had attempted to advance into the mine-free area to the west. These were stopped by heavy fire from *Kampfgruppe Sud* and the survivors of II Battalion, 382<sup>nd</sup> Grenadier Regiment, II Battalion, 62<sup>nd</sup> Infantry Regiment, and III Battalion, 61<sup>st</sup> Infantry Regiment. The shoulders of the Allied salient were held by two battalions, neither of which had, as yet, faced a major ground assault. The Saarlanders of II Battalion, 125<sup>th</sup> Grenadier Regiment under *Hauptmann* Wendel anchored the north end of the line (just north of the 9<sup>th</sup> Australian Division zone), and to the south, Captain Atillio Caimi’s III Battalion, 61<sup>st</sup> Infantry Regiment (in the 2<sup>nd</sup> New Zealand Division zone<sup>i</sup>) continued to hold its main defensive line.<sup>242</sup> However, III Battalion, 61<sup>st</sup> Infantry Regiment had also been seriously damaged by artillery fire. Continuing southeast along Miteiriya Ridge, II Battalion, 433<sup>rd</sup> Grenadier Regiment, I Battalion, 61<sup>st</sup> Infantry Regiment, and I Battalion, 433<sup>rd</sup> Grenadier Regiment continued to hold their main line of defense behind Mine Box K, in the 1<sup>st</sup> South African Division zone, despite the loss of their outpost companies. In this sector, British armor (apparently from the 8<sup>th</sup> Battalion, Royal Tank Regiment) was reported to have suffered heavy losses from some of the captured aircraft bombs that the pioneers had converted into mines.<sup>ii</sup> Although the South Africans had made only limited progress, General Montgomery’s plan did not require much in this zone.<sup>243</sup>

Between the two shoulders of the penetration, chaos reigned among the Axis defenders of the 102<sup>nd</sup> Trento and 164<sup>th</sup> divisions. One report indicated that most of Major Vavassori’s I Battalion, 62<sup>nd</sup> Infantry Regiment, at the northern end in the Australian sector, had been overwhelmed, with only one company continuing to defend itself at the northern edge of Mine Box J. The Australians had also forced back portions of *Hauptmann* Pieper’s I Battalion, 382<sup>nd</sup> Grenadier Regiment. Meanwhile, in the Highlanders’ zone, III Battalion, 62<sup>nd</sup> Infantry Regiment of Major Perotti had been completely overrun. By dawn, the stubborn III Battalion, 382<sup>nd</sup> Grenadier Regiment formed an isolated island of resistance as they continued to fight the Highlanders.<sup>iii</sup> Further isolating the Rheinlanders of III Battalion, 382<sup>nd</sup> Grenadier Regiment, Captain Manasseis’s adjacent II Battalion, 62<sup>nd</sup> Infantry Regiment in the New Zealanders’ zone, had been overrun by 0400, and was reported to be fleeing to the west.<sup>244</sup> The New Zealanders had also forced back *Hauptmann* Krupfganz’ II Battalion, 382<sup>nd</sup> Grenadier Regiment, but only after his men had waged a hand to hand struggle against the New Zealanders. When the New Zealand infantry attacked with fixed bayonets, the Rheinlanders replied with hand grenades and submachine guns. At dawn, British tanks from the 8<sup>th</sup> and 9<sup>th</sup> armoured brigades had rolled forward, overrunning some of the battalion’s forward positions. Soon, a handful of wounded men were taken prisoner while the survivors of the badly damaged battalion withdrew a short distance and reformed to the west. The battalion adjutant, *Leutnant der Reserve* Heinz von Wietzke was among the wounded evacuated from the front.<sup>245</sup>

With their Italian comrades of the 62<sup>nd</sup> Infantry Regiment mostly overrun by dawn, the Rheinlanders of *Oberst* Hirsch’s 382<sup>nd</sup> Grenadier Regiment were left desperately attempting to hold what remained of their positions in the main defensive line (Map 16). Although the remains of the German battalions continued to stand firm, often under fire from both flanks, it was feared that they could not continue to do so for much longer.<sup>246</sup> After 0400, in an attempt to stabilize the situation, General Gloria, commander of the XXI Corps, had ordered General Masina, commander of the 102<sup>nd</sup> Trento Division, to commit his reserve, II Battalion, 61<sup>st</sup> Infantry Regiment from its position in the second echelon in front of the New Zealand 6<sup>th</sup> Brigade. They were to move to the sector left by the collapse of the II Battalion, 62<sup>nd</sup> Infantry Regiment and counterattack at dawn.<sup>247</sup>

Several units of the 102<sup>nd</sup> Trento Division, including the antitank gunners of Captain Vigano’s Sardegna Grenadiers and Captain Alberti’s 51<sup>st</sup> Engineer Battalion, were reported to have fought well. The 102<sup>nd</sup> Trento Division’s artillery, under Colonel Randi’s 46<sup>th</sup> Artillery Regiment (with the Cena, Oggeri, Casini and Bortolani battalions) as well as various other artillery groups had also waged a brave fight against the superior Allied

<sup>i</sup> This battalion was in the zone of the New Zealand 25<sup>th</sup> Infantry Battalion that had failed to attack its final objective because of a navigational error.

<sup>ii</sup> *Foxes of The Desert, The Story of the Afrika Korps*, page 286. However, this can not be substantiated from Allied sources and appears to be false.

<sup>iii</sup> One source, Caccia-Dominioni, states that according to reports reaching 102<sup>nd</sup> Trento Division Headquarters, III Battalion, 382<sup>nd</sup> Grenadier Regiment had been the first to yield. However, this is not supported by any other references including the Italian Official History by Mario Montanari or Allied sources.





As Oberst Fritz Bayerlein, Chief of Staff for the *Deutsches Afrika Korps*, commented, “*The offensive as a whole made less progress, and went slower, than the British Command hoped. That was largely due to the density of the minefields.*”<sup>250</sup> By dawn, it appeared that the Allies in the northern sector had breached the main mine belt in at least two locations. The success of the Axis defense, now hinges on the ability of the units in the second line of defense to withstand the next onslaught by the Allies and seal any penetrations of the first defensive line. The positions in this second line of defense were manned by the three *kampfgruppen* formed from the 15<sup>th</sup> Panzer and 133<sup>rd</sup> Littorio Armored divisions (Map 17). Their mission was to counterattack and eliminate any penetrations of the main defensive line.

#### 6.5.7. ALLIED DESERT AIR FORCE

From the start of the attack the night before, the Allied Air Forces gave very strong support to the ground troops. By dawn, as the artillery fire became intermittent, Allied air-attacks intensified. Indeed, the 15<sup>th</sup> Panzer Division’s *Kriegstagebuch* records nine separate attacks on this division alone during the daylight hours of 24 October.<sup>251</sup> Already, some Axis soldiers were talking about the so-called ‘Flying Fortresses’, which came over in set formations, eighteen, thirty-six, or even fifty-four at a time. With their bombs, they seemed to systematically carpet the entire front. The perfectly symmetrical formations of gleaming silver bombers did not look all that impressive at first sight. However, as one’s eyes became accustomed to the glare, one could gradually make out the swarms of much smaller Hurricanes, Curtis P-40s and Spitfires circling above the bombers like gnats accompanying a party of dragonflies. This comparison led to the frightening realization of the true size of the B-17 Flying Fortresses.<sup>252</sup> For the *panzerarmee*, however, this was still a “poor man’s war.” General Montgomery himself had material to spare. Above all, he used his air forces to the full. The Royal Air Force now had air superiority in the North African theatre of war. The Axis ground forces were constantly bombed. The usual British raid was with eighteen bombers escorted by fourteen fighters, which the German soldiers got to know as the “*pig-headed eighteen.*” They seemed to never deviate from their course and bombed grid square after grid square. Moreover, they always seemed to come in formations of eighteen.<sup>253</sup>

#### 6.5.8. 8<sup>th</sup> ARMY<sup>i</sup>

In order to effectively control his operation, General Montgomery had located his Tactical Command Post, along with that of General Leese’s XXX Corps, three-and-a-half kilometers north of the village of El Alamein on the Mediterranean coast. General Lumsden’s X Corps Headquarters was located nearby, about three kilometers southeast of the village. By dawn on 24 October, the normal confusion that reigns at the start of a major battle in a high level headquarters was present in the Tactical Command Post of the 8<sup>th</sup> Army. It was caused by the usual problems, such as communications failures as well as incomplete and inaccurate reports. For instance the first incoming reports, at 0550, stated that the New Zealanders had got on to the Miteiriya Ridge ‘*with no anti-tank guns or tanks. The minefield behind is not yet clear and no vehicles can pass through*’; whereas the first reports from the Australians were so optimistic that they received a warning order that stated: ‘*that if Australian Division had only slight casualties the Army Commander may decide to attack on coastal sector to clear up that while the going is good.*’ By 0915, the picture had reversed; the reports now stated that no armor was through on the right and instead of the Australians being ordered to start ‘*crumbling*’ operations to the north of the salient, it was the New Zealanders who were intended to exploit south of Miteiriya Ridge. By the time General Montgomery awoke, his staff officers had been able to largely clarify the situation, which appeared encouraging to the 8<sup>th</sup> Army Commander. In eight and a half hours, XXX Corps had smashed its way on to Miteiriya Ridge on its left. Although it was held up short of its objective on most of the 51<sup>st</sup> Highland Division’s front in the middle, it appeared to be through the Axis minefields on its right, at the northern, Australian end of the assault. Casualties varied and were still not accurately known. Nevertheless, they did not appear to be exorbitant for such a magnificent performance by the infantry. Moreover, for the first time in the history of the desert campaign, dawn had broken with British armor out in battle positions alongside the foremost infantry on the left of the salient. Although the armor had not yet been able to penetrate beyond Miteiriya Ridge to Phase Line Pierson in order to form the outer ‘*shield*’ for XXX Corps’

<sup>i</sup> In his diary General Montgomery recorded the salient moments and features of the battle; however, his entries were written retrospectively each evening. Fortunately (although 8<sup>th</sup> Army’s War Diary was burned in an accidental fire at the end of the North African campaign), the log-book of messages between Tactical and Main Headquarters has survived, and from this it is possible to reconstruct the battle picture at the 8<sup>th</sup> Army’s Tactical Headquarters as it evolved.

'crumbling' operations—it appeared at least that it was through the minefields on the ridge and in considerable strength.<sup>254</sup>

The main reason for XXX Corps' failure to take all of its objectives along Phase Line Oxalic seems to be that the "Lightfoot" plan asked too much of the infantry, armor and sappers in the time allocated. Likewise, the main explanation of the X Corps' failure to advance to Phase Line Pierson was that General Montgomery's plan was unrealistic. General Montgomery's expectation that the armor of X Corps could advance, without significant opposition, from Phase Line Oxalic to Phase Line Pierson and give battle on ground of its choosing in the Axis rear area was, apparently, based on the assumption that there were no significant Axis defenses beyond Phase Line Oxalic.<sup>255</sup> This assumption proved to be false. In many places, Phase Line Oxalic was east of the artillery and antitank gun positions of the Axis infantry battalions that defended the main defensive line. Beyond the main defensive line, the *kampfgruppen* of the 15<sup>th</sup> Panzer and 133<sup>rd</sup> *Littorio* Armored Divisions were deployed, apparently, undetected by Allied aerial reconnaissance (Map 17).

As mentioned earlier, the 'Devil's Gardens' had proven to be the most serious obstacle to an armored breakthrough. On Miteiriya Ridge, some of the officers of the 8<sup>th</sup> Army felt that an extra half-hour of darkness might have done the trick, but even still, this would have left the tankers of X Corps to confront *Oberst Teege's Kampfgruppe Sud* without infantry support at dawn.<sup>256</sup> However, some of the stunned Axis prisoners could not believe how quickly the 8<sup>th</sup> Army had breached the 'Devil's Gardens.' Indeed, some supposed that their engineers had failed to arm the mines correctly, while still others believed that some revolutionary new invention must be the explanation.<sup>257</sup>

General Montgomery now realized that there was a danger that the momentum of the attack would be lost, allowing the Axis to consolidate in positions farther west. Faced with the failure of the armor to breakthrough, General Montgomery had three courses of action open to him to persuade the *panzerarmee's* armor to give battle such that it might be engaged and destroyed. First, he could continue with the current plan of attack and attempt to expand the existing breach beyond the fortified area. Two, he could plan and execute a new attack to breach the defenses at a weaker part of the front. Or three, he could attempt to entice the Axis, through the methodical destruction of their infantry, to launch armored counterattacks through their own minefields, in effect, try to begin 'crumbling' the defenses as he found them. He decided to attempt the latter option first.<sup>258</sup>

#### 6.5.9. DEUTCH-ITALIENISCHEN PANZERARMEE REPOSITIONS ITS FORCES

On the warm and sunny morning of 24 October, the situation was still unclear to *General der Kavallerie* Stumme. He had not yet intervened in the fight with any of his army-level assets, nor reserves. He had difficulty determining the situation and intended to use his few available assets in a frugal as well as a correct manner.<sup>259</sup> Most of his normal communications channels had been knocked out by the combined weight of the 8<sup>th</sup> Army's artillery barrage and air force bombing, aided by aircraft 'jamming' his radio frequencies.<sup>260</sup> During the night, the *panzerarmee* headquarters was only able to ascertain that the outpost line had nearly disappeared in the sectors under attack, that the Allies had penetrated into mine boxes J and L with tanks and infantry, and that the main defensive line had been penetrated in the area on both sides of Mine Box L. *Oberstleutnant* Westphal, acting *panzerarmee* Chief of Staff during *Generalmajor* Gause's absence, noted, "*General Stumme wanted to immediately hasten to the front. He was an extraordinarily courageous man and difficult to restrain. I was able to convince him that there would be very little that he could see of the battle line in the moon light.*" By dawn, more reports on the Allied attacks, however, were finally coming in by messenger. For example, 15<sup>th</sup> Panzer Division received a report that one battalion of Italians (either the I or III Battalion, 62<sup>nd</sup> Infantry Regiment) in the Australian zone had just 'disappeared.' A message from the 133<sup>rd</sup> *Littorio* Armored Division stated that the German battalion (I Battalion, 382<sup>nd</sup> Grenadier Regiment) in this sector was, "*wiped out by drunken Negroes with tanks.*"<sup>261</sup> Slowly, the headquarters of the *panzerarmee*, near Ghazal (over twenty kilometers west of the front) was able to assemble an incomplete mosaic of the confused situation at the front. Under the circumstances, it was very difficult to develop a clear understanding of the situation, let alone identify the 8<sup>th</sup> Army's point of main effort. It was at this point that the shortcomings of the *panzerarmee's* complex command and control arrangements and lack of clear lines of responsibility, particularly in the sector shared by the 164<sup>th</sup> *Leicht Afrika* and the 102<sup>nd</sup> *Trento* divisions, became apparent. Although the Rheinlanders of the II and III battalions, 382<sup>nd</sup> Grenadier Regiment, were still resisting tenaciously, it was feared that they could not continue to do so for much longer.<sup>262</sup>



Early in the morning, *Generalmajor* Lungerhausen, Commander of the 164<sup>th</sup> *Leicht Afrika* Division, proposed to form a new line of strong points by withdrawing his surviving infantry to the west and having the new sector assigned to his division. However, *General der Kavallerie* Stumme decided to limit the efforts of the *panzerarmee* to a pure and simple restoration of the main defense line that had fallen to the Allies. Thus, two German companies would plug the gap in the north, left by the collapse of most of I Battalion, 62<sup>nd</sup> Infantry Regiment. Two panzer companies would move forward to support the remnants of I Battalion, 382<sup>nd</sup> Grenadier Regiment. The III Battalion, 115<sup>th</sup> Panzer Grenadier Regiment would fill the hole left by the collapse of the III Battalion, 62<sup>nd</sup> Infantry Regiment. The II Battalion, 61<sup>st</sup> Infantry Regiment, which General Gloria, commander of the XXI Corps, had earlier ordered forward from its reserve position, apparently had its counterattack mission cancelled, and was now ordered to replace the II Battalion, 62<sup>nd</sup> Infantry Regiment (Map 17).<sup>263</sup> By these measures, *General der Kavallerie* Stumme was able to somewhat shore-up his front.<sup>264</sup> By 0640, *General der Panzertruppe* von Thoma's *Deutsches Afrika Korps* had slightly adjusted its deployment (as mentioned earlier) by sending *Hauptmann* Hinrich's 33<sup>rd</sup> Panzer Pioneer Battalion, from the 15<sup>th</sup> Panzer Division's reserve to the southern flank of the III Battalion, 115<sup>th</sup> Panzer Grenadier Regiment. In addition, *Kampfgruppe Sud* had moved the Wurttembergers of the 2<sup>nd</sup> and 3<sup>rd</sup> companies from the 8<sup>th</sup> Panzer Regiment forward 1000 to 2000 meters toward the New Zealanders, and deployed them near the headquarters of the 8<sup>th</sup> Panzer Regiment. At 0715, *General der Kavallerie* Stumme decided to attempt to regain the initiative and ordered: "*The Afrika Korps and XX Corps will immediately reestablish the situation with strong attacks by the 15<sup>th</sup> Panzer Division and the Littorio Armored Division. The first task is to force the enemy back beyond the main line of resistance.*"<sup>265</sup>

The cumbersome command arrangement, selected by *Generalfeldmarshall* Rommel, now made it was necessary to coordinate these counterattacks between the two corps (*General der Panzertruppe* von Thoma's *Deutsches Afrika Korps* and General Stephani's XX Motorized Corps) and the two divisions (*Generalmajor* von Vaerst's 15<sup>th</sup> Panzer Division and General Bitossi's 133<sup>rd</sup> *Littorio* Armored Division) that were involved. By 0845, the penetration by the 51<sup>st</sup> Highland Division had been, temporarily at least, sealed by the intervention of Major Schemel's *Kampfgruppe Mitte*. This counterattack was conducted by elements of the II Battalion, 8<sup>th</sup> Panzer Regiment; the III Battalion, 115<sup>th</sup> Panzer Grenadier Regiment; the *Semoventes* of the DLVI (556<sup>th</sup>) Self-propelled Artillery Battalion and the M14 tanks of the IV Battalion, 133<sup>rd</sup> Armored Regiment (the last two units were from the Italian 133<sup>rd</sup> *Littorio* Division). The armor had advanced 1000 to 2000 meters from their positions and then executed a successful "attack by fire," stopping the Allied advance. Although *General der Kavallerie* Stumme had intended for this counterattack to restore the situation in Mine Box J, it would appear that they did not attempt to regain the positions lost by the III Battalion, 62<sup>nd</sup> Infantry Regiment. This, combined with the success of *Kampfgruppe Sud* (described below) helped reestablish a defensive front.<sup>266</sup>

At about 0930, instead of waiting for the situation to be clarified by reports from the front, *General der Kavallerie* Stumme did what *Generalfeldmarshall* Rommel would have almost certainly done in the same situation, he prepared to set out to see the battlefield for himself. *Oberstleutnant* Westphal, who had served with *General der Kavallerie* Stumme in the same cavalry division 20 years before, recommended that he take an escort and a signals truck with him, as *Generalfeldmarshall* Rommel always did. However, *General der Kavallerie* Stumme would only take with his signals officer, *Oberst* Buchting (now one of the most experienced officers in the headquarters of the *panzerarmee*). The general said that he was only going as far as the battle headquarters of the 90<sup>th</sup> *Leicht Afrika* Division. As he was leaving, in his last words to *Oberstleutnant* Westphal, *General der Kavallerie* Stumme said that he could not standby any longer.<sup>1</sup>

## 6.6. CONSOLIDATION ALONG PHASE LINE OXALIC, DAWN TO DUSK, 24 OCTOBER

### 6.6.1. KAMPFGRUPPE SUD COUNTERATTACKS

At 0730, about 23 panzers (estimated at only 4 Panzer IV "Specials," 7 Panzer III "Specials," and 12 Panzer IIIs) manned by the Wurttembergers of the 1<sup>st</sup> and 4<sup>th</sup> panzer companies, I Battalion, 8<sup>th</sup> Panzer Regiment

<sup>1</sup> *Deutsch-Italienischen Panzerarmee Schlachtbericht*, *Generalfeldmarshall* Rommel's escort normally consisted of his chief-of-staff, a number of messengers, one or two command cars, and five or six kubelwagons (roughly equivalent to a US jeep). This was followed by fourteen to fifteen communications trucks and two armored cars. As a matter of principal, *Generalfeldmarshall* Rommel personally directed the operations of his main effort, basing his decisions on his own observations. As a result, no time was lost waiting for reports. See *The Rommel Papers*, page 303, and for a more detailed description of *Generalfeldmarshall* Rommel's battle command techniques, see "Command Techniques Employed by Field Marshal Rommel in Africa," by Alfred Gause, *Armor Magazine*, July-August, 1958, pages 22-25. See also *Erinnerungen*, page 175.



under Knight's Cross Holder *Hauptmann* Otto Stiefelmayer assembled for a counterattack. They were to attack toward A.P. 489. Their objective was to regain control of the old main line of resistance in the sector formerly held by the II Battalion, 62<sup>nd</sup> Infantry Regiment.<sup>267</sup> Within a few minutes, they launched their attack, advancing 1500 to 2000 meters from their positions on El Wishka Ridge. Soon, as their counterattack, approached within about 1,000 meters of the Royal Wiltshire Yeomanry Regiment, the panzers began receiving support from about 34 Italian M14 tanks of the XII Battalion, 133<sup>rd</sup> Armored Regiment, who began firing also (Map 17). Major Blount described the action, *"The German tanks came into view slowly, in a fairly close formation, and halted when our first A.P. shells landed among them. The light was good for us and I think we must have been better concealed from them than we felt. The sun was behind us and we were well below the sky line. I counted 28 and was pretty certain in identifying them as German Mark IVs. They remained halted for a long time and we could see men walking about as if some sort of 'O' Group was being held in spite of our shooting. Two or three of them were hit and caught fire. I don't know which of us scored the first kill but probably each of us thought, as my crew did, that it was theirs. There was no doubt that our 75mm A.P. was doing damage, and their return fire did not appear to penetrate the Sherman's front armour at that range. It was concealed 88mm guns on our flanks that eventually knocked out all our tanks, but, by that time, our reserve armour (3<sup>rd</sup> Hussars) had got into position on the ridge behind us, the N.Z. Infantry had dug in, and their anti-tank guns were positioned. The German armoured counter-attack on Miteiriya Ridge did not materialise."*<sup>268</sup> At 0745, Lieutenant-Colonel Sykes, the commander of the Royal Wiltshire Yeomanry Regiment, had been wounded by a shell fragment. He was replaced by Major Gibb, his second in command. At 0847, *Kampfgruppe Sud* reported to 15<sup>th</sup> Panzer Division, *"Now 100 enemy tanks in box L. Our attack from the south in front of the dummy minefield has come to a halt. At 1600m meters from the enemy. Positioned between (A.P.) 488 and (A.P.) 404."*<sup>269</sup> Finally, at 1000, *Kampfgruppe Sud* reported to 15<sup>th</sup> Panzer Division that A.P. 489, their objective, had been retaken. This, combined with the success of *Kampfgruppe Mitte*, described earlier, helped reestablish the defensive front of the *panzerarmee*.

At 1100, *Kampfgruppe Sud* was directed by 15<sup>th</sup> Panzer Division to employ their four 88s from 2<sup>nd</sup> Battery, I Battalion, 43<sup>rd</sup> Flak Regiment in the antitank role. However, they were not committed as antitank guns during Operation Lightfoot. Also about this time, generals von Vaerst, Lungerhausen and the three *kampfgruppe* commanders met to discuss the situation and possible countermeasures. By mid-day, *Hauptmann* Stiefelmayer claimed to have knocked out about 8 of the British tanks (in fact, these appear to have been knocked out by the antitank guns of the Rheinlanders and II Battalion, 115<sup>th</sup> Panzer Grenadier Regiment). At the end of this engagement, the Royal Wiltshire Yeomanry Regiment had only one Sherman and three Grants left operational as they withdrew behind Miteiriya Ridge (after they had exhausted their ammunition). Once behind the ridge, they began to refuel and rearm.<sup>270</sup> The initial Allied breakthrough beyond the 2<sup>nd</sup> New Zealand Division's sector had been blocked for the time being. To exploit this local success, the 164<sup>th</sup> *Leicht Afrika* Division began to shift the fresh III Battalion, 433<sup>rd</sup> Grenadier Regiment from division reserve to fill the gap left by the collapse of II Battalion, 62<sup>nd</sup> Infantry Regiment between the hard pressed II and III battalions of the 382<sup>nd</sup> Grenadier Regiment.<sup>271</sup> Later in the day after III Battalion, 433<sup>rd</sup> Grenadier Regiment had relieved *Hauptmann* Stiefelmayer's panzers and the infantry of II Battalion 115<sup>th</sup> Panzer Grenadier Regiment, the panzers were then able to return to their original positions on El Wishka Ridge.<sup>272</sup>

## 6.6.2 ITALIAN III BATTALION, 61<sup>st</sup> INFANTRY REGIMENT HOLDS THEIR POSITION

Opposite the 25<sup>th</sup> New Zealand Infantry Battalion and the South Africans of the Capetown Highlanders, Captain Caimi's III Battalion, 61<sup>st</sup> Infantry Regiment continued to hold along Miteiriya Ridge. As stated earlier, the Capetown Highlanders had captured three officers and 48 men from this unit. Most probably, these men were from the 11<sup>th</sup> Company, which had been manning the line of combat outposts in this sector. With the loss of the 11<sup>th</sup> Company, III Battalion, 61<sup>st</sup> Infantry Regiment (about 110 men equipped with two heavy machine guns and six light machine guns) and other losses, Captain Caimi's battalion had been reduced to about 19 officers and 340 men equipped with six 47/32 antitank guns, seven 20mm antitank rifles, six heavy machine guns, sixteen light machine guns, and four 81mm mortars. Apparently, Captain Caimi had deployed the three remaining companies of his battalion echeloned one behind the other (Map 8). Second Lieutenant Eithel Torelli, whom Colonel Sillavengo described as being *"bold, merry and refreshingly outspoken,"* was assigned to Captain Caimi's 12<sup>th</sup> Company. The lieutenant described the situation as follows, *"At three o'clock it was our turn. The bombardment stopped when the sun rose, and the breeze cleared the smoke and dust. Through the binoculars I could see three 88mm guns not far away (apparently a battery of captured 25-pounders pressed into service with the II Battalion, 46<sup>th</sup> Artillery Regiment). The enemy infantry (apparently the Capetown Highlanders) were a few hundred yards distant. We were*

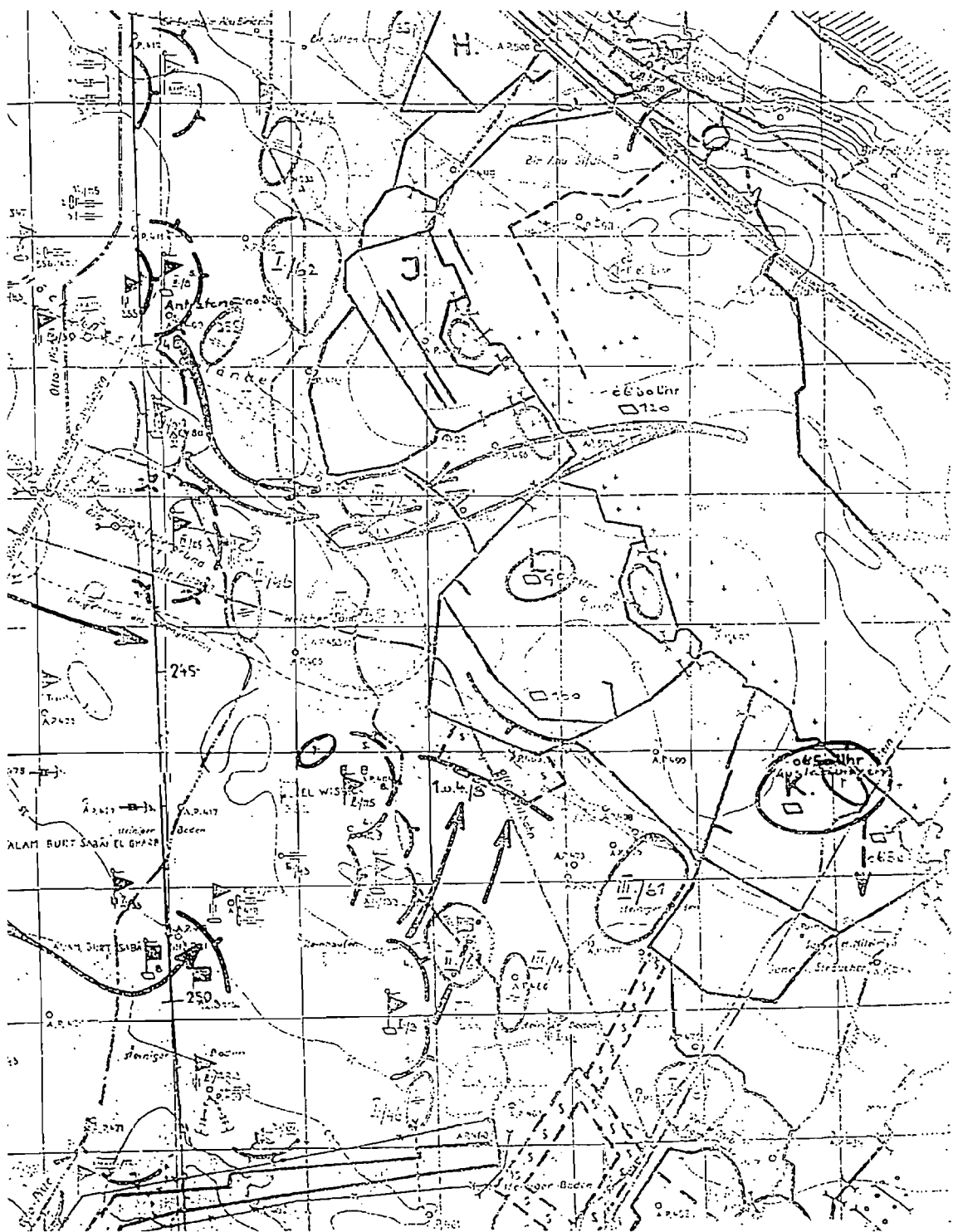
*firing away with our automatic weapons all morning, but things got a bit hot for us when they began to find the range with their mortars. On the flat stretch to the north there must have been about a hundred tanks (apparently those of the 9<sup>th</sup> Armoured Brigade and 10<sup>th</sup> Armoured Division in the 6<sup>th</sup> New Zealand Brigade zone). Our mortars got four of them and set them on fire. In the evening we established communications among our selves and exchanged news and opinions. I made the usual report to the Captain, and we cracked a few old jokes; but it was obvious that we were both worried.”<sup>273</sup>*

### 6.6.3. 6<sup>th</sup> NEW ZEALAND BRIGADE CONSOLIDATES

The 6<sup>th</sup> Field Regiment’s observation posts, from first light onwards, had attempted to engage Axis positions. However, as the forward observers soon discovered, the Axis antitank guns, of the III Battalion, 61st Infantry Regiment; II Battalion, 382nd Grenadier Regiment; and *Kampfgruppe Sud*, which were holding up the advance of the armor, were not easily suppressed by long-range 25-pounder fire. Soon, two artillery officers were slightly wounded by a mine, while an armor-piercing shot killed an observer, Lieutenant D’Arcy. The other two field regiments and XXX Corps’ 69<sup>th</sup> Medium Artillery Regiment also had observation posts operating on Miteiriya Ridge by first light and they found plenty of targets throughout the day: tanks, transport and infantry. They engaged them freely; but there was soon another misunderstanding with Brigadier Currie, commander of the 9<sup>th</sup> Armoured Brigade. He reported to General Freyberg at 1032 that the 9<sup>th</sup> Armoured Brigade needed artillery support and that there were two observation posts available, but they were under orders not to shoot, except on Brigadier Weir’s orders. When Brigadier Weir heard of this a few minutes later, he was ‘mystified.’ He had already sent every observation post forward and ordered them to shoot at anything they saw. The main problem seemed to be maintaining communications. The tanks kept damaging the artillery’s field telephone lines, while radio was not working well. The crews of the 4<sup>th</sup> Field Regiment’s armored observation posts were, in fact, well forward with the leading tanks and found things lively. They were trying to survive and fight in a situation in which even the more heavily armored Shermans could advance no farther against the heavy and accurate antitank fire. For the unarmored observation posts of the other field artillery regiments, this was a highly dangerous situation indeed.<sup>274</sup>

The 6<sup>th</sup> Field Regiment’s headquarters and its 29<sup>th</sup> Battery were much hampered by the masses of vehicles that had come forward during the night, and late in the afternoon. Lieutenant-Colonel Walter moved the newcomers into the area, near Bir el Makh Khad, formerly occupied by the 4<sup>th</sup> Field Regiment. The guns of the 43<sup>rd</sup> Battery, 14<sup>th</sup> Light Anti-Aircraft Regiment, were also nearby, except for the Left Section of G Troop (which had gone forward earlier, at 0200, to guard a gap in the first Axis minefield). One gun from this section was damaged by German 5 cm Pak 38 armor piercing shot and had to be sent back to the maintenance workshops. About this time, a gunner in the regimental headquarters of the 14<sup>th</sup> Light Anti-Aircraft Regiment was killed by a booby trap. Clearly, more room was urgently needed to deploy all of the combat support and follow-on combat elements that were crowding forward behind Miteiriya Ridge but the Axis minefields were vast. Every square meter of ground had to be assumed to be mined until it was checked and cleared by the sappers. This work required skill, courage and, above all else, time. This was not a job that could be rushed. It seemed that General Montgomery’s Operation Lightfoot had reached a most awkward stage.<sup>275</sup>

In this situation, E Troop, 4<sup>th</sup> Field Regiment came under fire soon after dawn at very close range, probably from surviving elements of the combat outpost line manned by the Sicilians of 11<sup>th</sup> Company, III Battalion, 61<sup>st</sup> Infantry Regiment. They were rescued from their predicament by South African infantry, who attacked and overcame them. Then, at 1000, heavy shellfire started to come down on the gun positions and the 4<sup>th</sup> Field Regiment’s transport. This shelling caused heavy losses, with 10 killed, including Captain Bell of E Troop, and 21 wounded. Captain Bell and two gunners had been standing by a Royal Engineer truck when a shell exploded nearby, killing all of them. In addition, a signals truck ran over a mine nearby and was destroyed, causing four more casualties. Later in the day, the Survey Troop of the division artillery also had a truck blown up on a mine, fortunately without causing casualties.<sup>276</sup>



**MAP 17. 15<sup>th</sup> Panzer Division Situation Map, as of 0900, 24 October,  
Showing the Counterattack by *Kampfgruppe Sud*  
(See Annex 3, Appendix E for an explanation of German military symbology)**



As the artillery and tank duel with *Kampfgruppe Sud* continued toward mid-day, the 26<sup>th</sup> Infantry Battalion's medical officer was busier than ever. Stretcher-bearers carried the wounded to collection points and his jeep would race down the forward slope to pick them up. The captured German aid station was cleared soon and the flag taken down. It seemed that this flag had been drawing considerable Axis fire by giving the approximate position of the rifle companies. After its removal, there was nothing to indicate where over 200 men were deployed on the forward slope.<sup>277</sup> Throughout the day, the adjacent 25<sup>th</sup> Infantry Battalion, still on the eastern slope of Miteiriya Ridge, was also shelled from time to time, causing them additional casualties.<sup>278</sup>

Meanwhile, Major Reid's 8<sup>th</sup> Field Company was dispersed near Lieutenant Hanger's section east of the second Axis minefield. Lieutenant Hanger described their situation, "*When day dawned we were able to look around and study our position. The company was scattered along the track, widening minefield gaps (to 40 yards) and inspecting suspicious areas. The view from the ridge was an eyeopener. Where yesterday there had not been a sign of life, the whole area as far as one could see was now packed tight with tanks, guns, and trucks. The enemy was still in possession of the western side of the ridge and shelled us all day.*

*At 10 a.m. we received orders for the company to retire to Brigade H.Q., which was still in the original spot, just behind the previous F.D.L.s. We spent the rest of the day widening gaps and erecting permanent fences. Electric lamps for gap marking were checked over and placed in readiness for darkness. Each night we supplied a small maintenance party at every gap to supervise the passage of traffic and maintain the fences and lights. These electric lamps were always disappearing, and we had to be sure they were collected at day break, for they made a very nice torch and were coveted by all ranks.*

*In view of the casualties in No. 2 Section they were not in a position to carry on as a separate working unit, so were split up to reinforce the other two sections.*

In addition, the Royal Engineers of Major Carr's 141<sup>st</sup> Field Park Squadron, 10<sup>th</sup> Armoured Division had completed widening and marking Boat Track through the first Axis minefield, while the 571<sup>st</sup> and 573<sup>rd</sup> army field companies had been pulled back to work on widening the rearward breaches. Later in the day, they reverted to the control of X Corps.<sup>279</sup>

The New Zealander's Divisional Reserve Group comprising, among others, Lieutenant Pickmere's party from the 5<sup>th</sup> Field Park Company and Major Woolcott's 6<sup>th</sup> Field Company (less two sections), had moved up during the night and dispersed behind the first Axis minefield on the left of the 5<sup>th</sup> Brigade's sector. Major Skinner's 7<sup>th</sup> Field Company, less No. 3 Section dug in behind the 21<sup>st</sup> Infantry Battalion, was dispersed east of their southern lane through the first Axis minefield, near 5<sup>th</sup> Brigade Headquarters.<sup>280</sup>

Shortly after midday, the Axis shelling slacked off, much to the relief of the infantry of the 6<sup>th</sup> Brigade. The rest of the day passed almost uneventfully, although some additional casualties did occur. At intervals during the afternoon, the Axis gunners sent over salvo after salvo, but at no time did the shelling become as heavy or continuous as in the morning. The forward troops had soon found that any movement quickly attracted heavy fire, not only from the guns on El Wishka Ridge, but also from machine gun and mortar posts on the left flank from the Sicilians of the III Battalion, 61<sup>st</sup> Infantry Regiment. Snipers in this area had the greater part of the 26<sup>th</sup> Infantry Battalion's sector under observation, and they made conditions rather uncomfortable. Mortars were used to engage these snipers, but they only succeeded in suppressing them temporarily. Matters were made worse as the heat intensified as the day wore on and by the ever-present flies. Since the troops were without the protection of deep trenches and mosquito netting, the flies were able to swarm around each shallow hole in their hundreds. Despite the soldier's most colorful efforts, cursing could not drive them away. Indeed, by this time, all ranks were thirsty, tired, and rapidly becoming irritable.<sup>281</sup>

Although a great deal of Axis movement was reported, the expected strong counter-attack did not develop only small, local ones, like *Hauptmann Stiefelmayer's* described earlier. This was because *General der Kavallerie Stumme* had forbidden large-scale counterattacks until he was ready to launch a coordinated counterattack. At 1130, *Generalmajor von Vaerst* assigned all *kampfgruppen* the task of holding the main line of resistance. At 1435, *Kampfgruppe Sud* reported that *Hauptmann Stiefelmayer's* 8<sup>th</sup> Panzer Regiment with the II Battalion, 382<sup>nd</sup> Grenadier Regiment, attacked A. P. 488. At about 1500, a column of transport was noticed moving along El Wishka Ridge. Shortly afterwards Axis infantry and tanks began to move down onto the flat and advance towards A Company, 26<sup>th</sup> Infantry Battalion. They were immediately engaged with indirect fire from the New Zealanders'

supporting 25-pounders and the tanks near the 26<sup>th</sup> Infantry Battalion's headquarters. Sergeant Foster's antitank gun scored a number of hits on a Panzer III at a range of about 1100 meters. This action did not last long, with the German infantry withdrawing under cover of a smoke screen and the panzers moving off to the south, leaving some of their number behind. Indeed, the nervous men in the area sounded the "counter-attack alarm" about every two hours from 0700 until 1600, with Allied artillery firing on any Axis concentrations that were observed. Indeed, every Axis movement appeared to disperse under fire and none developed into a serious threat to the New Zealand position. By noon, the number of Axis prisoners in the hands of the New Zealanders had risen to about 250, mostly infantrymen from the 382<sup>nd</sup> Grenadier Regiment and the 62<sup>nd</sup> Infantry Regiment with a few men from artillery and other units. Nearly half of the total was now German.<sup>282</sup>

While this was going on, two companies of the 133<sup>rd</sup> Motorized Infantry Brigade (British 10<sup>th</sup> Armoured Division) and one from the King's Royal Rifles arrived in trucks at 26<sup>th</sup> Infantry Battalion Headquarters. They had been ordered to take up a position, behind the New Zealand infantry, ready to follow the tanks when they broke through.<sup>i</sup> Lieutenant-Colonel Fountaine, realizing the folly of attempting to dig in on the forward slope in daylight, ordered them to disperse around his headquarters until nightfall.<sup>283</sup>

Later in the afternoon, Brigadier Gentry's battalion commanders attended a conference at the 6<sup>th</sup> Brigade Headquarters at which a plan for the next attack, an armored exploitation, was discussed. It was to be another night operation. At this conference, the 26<sup>th</sup> Infantry Battalion was tasked with providing protection to the sappers of Major Woolcott's 6<sup>th</sup> Field Company, who were responsible for breaching the troublesome last Axis minefield on the forward (western) slope of Miteiriya Ridge. The division artillery was to fire a barrage to conceal the sound of tank movement.<sup>284</sup>

#### 6.6.4. 8<sup>th</sup> ARMY ASSESSES THE SITUATION AND REACTS<sup>285</sup>

A tactical reconnaissance report from the Desert Air Force at 0900 hours recorded '*General impression: no movement in any direction*'. At 0910, General Gatehouse, Commander of the 10<sup>th</sup> Armoured Division, had reported to General Lumsden as follows:

*10 Armd Div Cmdr just returned from recce to Miteiriya. Situation as follows:*

- a) Few of our infantry on South of Ridge*
- b) Ridge held by armoured regiments of 8 Armd Bde. Movement down forward slopes draws heavy anti-tank and gun fire.*
- c) One regiment of 24 Armoured Brigade has been placed in right rear to guard against several small parties reported to be moving East towards 51 Div area.*
- d) Much congestion of transport, guns and tanks in NZ area.*

To General Montgomery, this was unbelievable. He knew that the New Zealanders held Miteiriya Ridge securely with infantry and antitank guns, and had no need of the 10<sup>th</sup> Armoured Division in their midst; moreover General Leese, who had toured the area earlier that morning, had reported remarkably little congestion. General Leese even suggested as early as 0800 that General Lumsden use the Miteiriya Ridge breach to get his right division (1<sup>st</sup> Armoured) through the minefields. This would have allowed them to by-pass the hold-up in the northern corridor, but General Lumsden was out of touch and his Brigadier General Staff (BGS) would take no action without conferring with him.

At 0915, General Montgomery issued his first orders to his corps commanders since Operation Lightfoot had begun:

*30 Corps: Tasks in order of priority*

- 1. Clear the Northern Lane*
- 2. Exploit success in South. 152 Brigade to take over from NZ Div on Miteiriya Ridge. NZ Div to exploit South...*

<sup>i</sup> The willingness of the British armor to advance without close infantry support would seem to illustrate the continuing lack of a combined arms approach to tactics that had hampered the 8<sup>th</sup> Army throughout much of its history. Motorized infantry may have been more effective at dealing with the hard-to-find antitank guns than the tanks were.

6. *Exploitation by 9 Aust Di-North not to start yet. Possibility of exploiting North tonight if armour is through gap is being explored...*

However, until the armor of X Corps could get out beyond the infantry divisions of XXX Corps, it would be impossible for the 'crumbling' operations to proceed, as General Montgomery wished. It soon became clear that General Montgomery felt his armor commanders were dragging their feet. The 1<sup>st</sup> Armoured Division in the right-hand (northern) corridor of the salient, astride the boundary between the 9<sup>th</sup> Australian Division and the 51<sup>st</sup> highland Division, was at a standstill. It had not even reached the forward infantry line; indeed much of its forces were still short of the first Axis minefield. While, in the left-hand (southern) corridor, in the 2<sup>nd</sup> New Zealand Division's zone, the 10<sup>th</sup> Armoured Division had gotten only the 8<sup>th</sup> Armoured Brigade on to Miteiriya Ridge at dawn. There, as stated earlier, after its lead elements had encountered a minefield covered by heavy fire from Axis antitank guns and severe shelling, they retired behind the ridge and dispersed. In the process, they drew a tremendous artillery bombardment on to the unlucky New Zealand infantry sheltering there. General Freyberg had then called for another armored advance; but neither General Lumsden, who was forward with the 1<sup>st</sup> Armoured Division further north, nor General Gatehouse, who was displacing his 10<sup>th</sup> Armoured Division's Tactical Headquarters, could be contacted.<sup>286</sup>

By 1000, it was obvious that the soldiers of the *panzerarmee* had recovered from their initial surprise. At 1040 General Lumsden's Brigadier General Staff spoke to General Montgomery about the left thrust, "*BGS explained the situation to Army Commander who agrees that to cross the Miteiriya Ridge would require full artillery support.*" However, this was easier said than done since, according to the X Corps Chief of Royal Artillery, General Lumsden appeared to have little understanding of artillery co-operation and did not even have his Chief of Royal Artillery with him.

General Leese, who was at General Freyberg's headquarters, behind Miteiriya Ridge, now telephoned General Montgomery. General Leese had finally found General Gatehouse and was infuriated by his unwillingness to exploit the success of the infantry, as he told the Army Commander. General Freyberg was personally offering to take his own attached 9<sup>th</sup> Armoured Brigade 'over the top' providing General Gatehouse gave him some support from the 10<sup>th</sup> Armoured Division. This General Gatehouse refused to do, as General Leese reported, "*Gatehouse says... anything that puts its nose over the ridge gets shot up. G's (Gatehouse) main preoccupation at moment is to get 10 Armoured Div into position to receive attack from someone else... He keeps saying he is trained for a static role. I think that is getting above him. I have told Bernard [Freyberg] to hold a meeting with Gatehouse and Brigadiers. I am placing whole Corps artillery at his disposal and am suggesting that under smoke they try and do something later in day... Now there is hardly anything happening.*"

This timid performance was not what General Montgomery had intended for the strongest armored corps fielded by the Allies in the war so far.<sup>287</sup> In his diary he noted, "*On the right, 1 Armd Div could not get out into the open because of the resistance still not overcome by 51 Div.*

*On the left 10 Armd Div could not cross the Miteiriya Ridge without heavy casualties owing to heavy fire from enemy artillery and A.Tk guns to the South-West.*

*I began to form the impression at about 1100 hours that there was a lack of 'drive' and pep in the action of 10 Corps. I saw Herbert Lumsden and impressed on him the urgent need to get his armoured divisions out into the open where they could manoeuvre, and that they must get clear of the minefield area. He left me about 1130 hours to visit his Divisions. So far he has not impressed me by his showing in battle; perhaps he has been out here too long; he has been wounded twice. I can see that he will have to be bolstered up and handled firmly.*

*Possibly he will be better when the battle gets more mobile.*

*This 'sticky' fighting seems beyond him.*"

This was the first reference in General Montgomery's battle diary to his disappointment in the performance of the British armor units. It should have come as no surprise to him, for it had been the armor's lack of faith, in the original 'Lightfoot' plan, which had caused him to re-cast their role. Nevertheless, it would appear that only the commander of the 10th Armoured Division had a reasonably accurate appreciation of the combat power possessed by *Kampfgruppe Sud*, which was now the main obstacle to continuing the advance to Phase Line Pierson.

To General Sir Oliver Leese, XXX Corps Commander, writing after the war, this was the lost opportunity of the battle. '*The armour now had a great opportunity,*' he declared. '*...Rommel had not yet returned from Italy*



[sic]. There was no controlling head and for once the Panzer Corps was fighting piecemeal. General von Stumme had been killed by shell fire... and if we could only have broken out during the early morning of the first day, we would have had a good chance to destroy the German armour piecemeal. But by midday on that day it was obvious that the armour had not broken through and to me it was very doubtful whether they could now do so.<sup>51</sup> General Montgomery continued in his diary:

*1200 In the North we had successfully broken in to the enemy positions and had secured a good bridgehead.*

*But we had so far not been able to pass Armoured Divisions of 10 Corps out in to the open.*

*My plan now was:*

*1. To get 1 Armd Div and 10 Armd Div out into the open as soon as possible. This to take priority of everything else. The whole artillery resources of 30 Corps to be used to assist...*

Thereafter, the 2<sup>nd</sup> New Zealand Division could begin its ‘crumbling’ operation. Verbal orders to the above effect were issued to the corps commanders at 1200. Adding a further censure of the performance of his armor commanders, General Montgomery recorded, “I gained the impression during the morning that the Armoured Divisions were pursuing a policy of inactivity; they required galvanising into action, and wanted determined leadership. There was not that eagerness to break out into the open on the part of Commanders; there was a fear of casualties; every gun was reported as an 88mm. General Montgomery’s disappointment was marked. With his armor well out beyond the minefields and engaging its German counterparts he felt that he could have begun his ‘crumbling’ operations immediately. This was intended to force an insoluble dilemma on the *panzerarmee*, now under the temporary command of *General der Panzertruppe* von Thoma: how to protect his forward infantry without first defeating the superior number of British tanks shielding General Montgomery’s ‘crumbling’ forces. By contrast, the failure of the armor to break out beyond the minefields meant that *General der Panzertruppe* von Thoma had a chance to contain the British attack by redeploying such artillery, tanks, antitank guns, machine guns and mine-laying pioneers, as needed to hold the 8<sup>th</sup> Army in their congested, mine-plagued salient. Whether or not his revised ‘Lightfoot’ plan had been an over-ambitious proposition, General Montgomery believed that he had been right to aim for a breakthrough on the first night. He recognized the magnificence of General Oliver Leese’s infantry penetrating the northern sector, despite heavy casualties. However, he was angered by the reluctance of the armored units to advance further. For this failure, he knew, the tank crews would pay dearly in the coming days.

At 1225, General Montgomery signaled urgently to General Lumsden, “*From Army Commander: It is necessary to get the two armoured divisions out through the 30 Corps final objective before the enemy can ring them in still further. Steps are already being taken to get 1st Armoured Div forward with 51 Div. Gen. Lumsden should meet Gen. Leese at NZ Div HEADQUARTERS and arrange support of 30 Corps artillery to get 10 Armoured Div out through the NZ Div front. The plan must be really properly teed-up with adequate artillery support, hence the necessity of starting early, if the operation is to be brought off this afternoon.*”

During a meeting between generals Leese and Lumsden at the 2<sup>nd</sup> New Zealand Division headquarters, General Freyberg’s brigadiers recommended a night attack—even though it was to be an armored operation without infantry support from the New Zealanders. General Freyberg needed his remaining infantry for the forthcoming ‘crumbling’ operations. As this would be primarily a X Corps operation, under the command of General Lumsden, and supported by the New Zealand Division Cavalry Regiment and the 9<sup>th</sup> Armoured Brigade, General Leese could only protest. He was painfully aware that the longer the *panzerarmee* was given to re-organize, the more difficult would be the task of General Lumsden’s armor.<sup>288</sup> When General Montgomery heard of General Lumsden’s plan—a night attack rather than an afternoon assault—he telephoned Lumsden’s Brigadier General Staff at 1305 hours and told him to, “*Inform Corps Commander that Army Commander considers it essential to get 10 Armoured Div out this afternoon.*”

Forty-five minutes later (1350), General Leese’s Brigadier General Staff reported to the 8<sup>th</sup> Army Commander that ‘*at approx. 1600 hours 10 Armd Div supported by Corps Artillery attack to cross Miteiriya Ridge*’. At 1405, General Montgomery signaled to General Lumsden’s Brigadier General Staff, to emphasize that ‘*one more*

<sup>51</sup> Sir Oliver Leese, unpublished memoirs. It is difficult to judge the fairness of these comments after more than fifty years. Some veterans and military historians have blamed General Montgomery, saying that even the revised ‘Lightfoot’ plan was too ambitious.

effort to get through bridgehead must be made. He is prepared to accept casualties provided armored divisions get out into open so he can continue NZ operation. Corps Commander to be informed of this.' Unfortunately, the 1<sup>st</sup> Armoured Division in the northern breach was achieving even less than the 10<sup>th</sup> Armoured Division. At 1350, the 8<sup>th</sup> Army's Chief of Royal Engineer, Brigadier Kisch, had signaled to General Montgomery that the forward brigade of the 1<sup>st</sup> Armoured Division 'appears to be making no progress.' Had General Lumsden diverted the rest of the division, via the New Zealand corridor, earlier that morning, as General Leese had suggested, they might have broken through. As it was, General Montgomery now had to intervene directly, "I was beginning to be disappointed somewhat in LUMSDEN, BRIGGS (1 Armd Div) and FISHER (2 Armd Bde), and also in GATEHOUSE.

But the main lack of offensive eagerness was in the North; both 9 Aust (Australian) Div and 51 Div were quite clear that 1 Armd Div could have got out without difficulty in the morning.

Lumsden was not displaying that drive and determination that is so necessary when things begin to go wrong; there was a general lack of offensive eagerness in 10 Corps.

I therefore spoke to Lumsden in no uncertain voice, and told him he must 'drive' his Divisional Commanders, and that if Briggs and Fisher hung back any more I would at once remove them from command and replace them by better men.

This produced good results and plans were made in conjunction with 30 Corps for Armoured Divisions to break-out."

An infantry attack by the 51<sup>st</sup> Highland Division was launched at 1500 in order to clear a passage for the 1<sup>st</sup> Armoured Division. At 1545, the 51<sup>st</sup> Highland Division reported that 'in the north, 1<sup>st</sup> Armoured Division is being pressed to push on by Army Commander.' Within half an hour reports were received indicating that the forward armored brigade had at last 'found a gap and will go through when they have finished mopping up.' By early evening, 1<sup>st</sup> Armoured Division was finally reported to be 'out' beyond the forward infantry. 'My application of "ginger" had worked,' General Montgomery noted with relief in his diary. By 1720, one brigade of the 1<sup>st</sup> Armoured Division reported itself to be on Phase Line Pierson, the original 'Lightfoot' objective for X Corps which was supposed to have been taken eleven hours earlier. It was bounded on the northern extremity by a mild, kidney-shaped depression, known through a map reading error as 'Kidney Ridge'. In fact, the 1<sup>st</sup> Armoured Division reports were wrong. According to artillery observers, the brigade was still far short of its objective. Nevertheless, for the moment, General Montgomery only had reports from the division on which to base his decisions. Next, he turned his attention to the 'left' corridor, which the 10<sup>th</sup> Armoured Division under General Gatehouse was intended to use to cross Miteiriya Ridge, link up with the 1<sup>st</sup> Armoured Division on Phase Line Pierson and thus form the armored shield essential to the infantry's 'crumbling' operations. The 8<sup>th</sup> Armoured Brigade had begun X Corps promised attack across Miteiriya Ridge at 1600, but it was only a half-hearted attempt. At 1845, General Lumsden's X Corps reported to the 8<sup>th</sup> Army Commander, "Situation on 8 Armoured Brigade front: 8 Armd Bde are on Northern side of Miteiriya Ridge in hull-down positions. They've been held up by minefields South of Miteiriya Ridge on the 289 grid. This minefield was laid today. The minefield is covered by guns and M.G's and a force of tanks—probably 21 Panzer. Littorio Group has been operating South of this minefield and has been engaged with 8 and 9 Armoured Brigades.<sup>1</sup> Up to 17 tanks have been claimed, with small loss to ourselves. An operation is being staged tonight to get 10 Armoured Division into the open. Location of 24 Armoured Brigade, not known."

The attack to get the 10<sup>th</sup> Armoured Division 'out' beyond Miteiriya Ridge had thus been postponed till nightfall—"zero" hour being set for 2200.<sup>289</sup> This was galling to General Montgomery—particularly in view of the fact that General Lumsden had 'lost' his entire 24<sup>th</sup> Armoured Brigade. Pleased at least with reports that the 1<sup>st</sup> Armoured Division was on Phase Line Pierson (which was confirmed by X Corps at 2100: 'General Lumsden is satisfied that 2<sup>nd</sup> Armored Brigade is on kidney-shaped feature'), General Montgomery retired to bed. It had been a frustrating day. The outstanding performance of the infantry had been offset by the subsequent failure of the British armor to reach Phase Line Pierson. The armored operations were now running almost twenty-four hours behind schedule, but once General Gatehouse's 10<sup>th</sup> Armoured Division was 'out' alongside General Briggs' 1<sup>st</sup> Armoured

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<sup>1</sup> This statement is incorrect in two particulars, the Axis did not start to emplace new minefields in this area until dusk, when elements of *Hauptmann Streitz*' 220<sup>th</sup> Pioneer Battalion began laying mines west of the 5<sup>th</sup> New Zealand Brigade. In addition, any German tanks in this area at this time would have been from the 15<sup>th</sup> Panzer Division, not the 21<sup>st</sup> Panzer Division, which was still deployed behind the southern part of the *panzerarmee*'s defensive line.

Division, General Montgomery felt he could begin ‘crumbling.’ He believed that he still held the initiative and was determined not to surrender it.

#### 6.6.5. ALLIED DESERT AIR FORCE SUPPORT ON 24 OCTOBER

Throughout the day, fighters and fighter-bombers had flown over the battlefield in that impressive formation that became known as the ‘eighteen imperturbables.’ In the north, the Desert Air Force’s main air effort was directed against the three *kampfgruppen* of the 15<sup>th</sup> Panzer and 133<sup>rd</sup> *Littorio* Armored divisions. In this effort, the Desert Air Force flew about 1,000 sorties, plus another 147 by the US Air Force, at a cost of eight bombers shot down and another 27 damaged.<sup>290</sup> To oppose this, the *Luftwaffe* had only 19 operational fighters available at this point. These were reported to have shot down 16 Allied aircraft, plus four more claimed by flak or ground fire.<sup>291</sup>

#### 6.6.6. GENERAL DER KAVALLERIE STUMME DISAPPEARS

*General der Kavallerie* Stumme’s staff car and driver (Corporal Wolf) had returned minus both him and *Oberst* Buchting. In addition, the situation map, which the general had taken with him was also missing. At first, it was unclear what had happened to them. Corporal Wolf, safe but in a state of shock, was at first unable to explain what had happened. When questioned by *Oberstleutnant* Westphal and the other officers at *panzerarmee* headquarters, all he could say was, “*They told me to get out of the firing area as quickly as possible, and when I looked around the car was empty.*” At 1030, *General der Kavallerie* Stumme was listed as missing.<sup>292</sup> Eventually, the officers learned that *General der Kavallerie* Stumme, accompanied by *Oberst* Buchting, after stopping at the headquarters of the 90<sup>th</sup> *Leicht Afrika* Division, had driven forward over the Alarm Track toward the front, where the 9<sup>th</sup> Australian Division had ambushed them. The extent of the Australian penetration into Mine Box J must have been completely unknown to them, as they drove straight into Australian machine gun and antitank gunfire. At this point, *Oberst* Buchting had received a fatal head wound. As Corporal Wolf tried to get his staff car out of the line of fire, *General der Kavallerie* Stumme, who had leaped out on to the road, grabbed on to the fast moving car. At some point, the general had a heart attack and fell off the vehicle without the driver noticing it.<sup>1</sup> Corporal Wolf had no doubt about the area where the general had vanished; it was near the Alarm Track between Hill 28 and AP 409.<sup>293</sup> Doubtless, the leadership of the *panzerarmee* would have preferred to keep the matter quiet; but they could not. One rumor that spread among the troops was that *General der Kavallerie* Stumme had been caught in the bombardment while inspecting defensive positions and killed. Others said he had left his command-post and gone dashing up to the front line like *Generalfeldmarshall* Rommel. As *Generalfeldmarshall* Albert Kesselring, Commander-in-Chief South later wrote: “*Anyone who knows how decisive the first orders in a defensive engagement are will have no difficulty in understanding what the loss of General Stumme meant for the whole battle.*”<sup>294</sup>

That afternoon, the German High Command began to take the necessary steps to return the ailing *Generalfeldmarshall* Rommel to North Africa. The *Generalfeldmarshall* described it thus, “*On the afternoon of the 24<sup>th</sup>, I was rung up on the Semmering by Field Marshal Keitel, who told me that the British had been attacking at Alamein with powerful artillery and bomber support since the previous evening. General Stumme was missing. He asked whether I would be well enough to return to Africa and take over command again. I said I would. Keitel then said that he would keep me informed of developments, and would let me know in due course whether I was to return to my command. I spent the next few hours in a state of acute anxiety, until the evening, when I received a telephone call from Hitler himself. He said Stumme was still missing—either captured or killed—and asked whether I could start for Africa immediately. I was to telephone him again before I actually took off, because he did not want me to interrupt my treatment unless the British attack assumed dangerous proportions. I ordered my aircraft for seven o’clock next morning and drove immediately to Wiener Neustadt.*”<sup>295</sup>

At 1700, command of the *panzerarmee* passed, temporarily, to *General der Panzertruppe* Ritter von Thoma, Commander of the *Deutsches Afrika Korps*, who chose to exercise command from the headquarters of the

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<sup>1</sup> According to *Generalfeldmarshall* Rommel, “*General Stumme had been known to suffer from high blood pressure and had not really been fit for tropical service.*” *The Rommel Papers*, page 305. A reconnaissance patrol from the German I Battalion, 125<sup>th</sup> Grenadier Regiment, 164<sup>th</sup> *Leicht Afrika* Division finally resolved the mystery of *General der Kavallerie* Stumme’s fate, when Sergeant-Major Holzschuh and Corporal Kiel of the 2<sup>nd</sup> Company finally found his body around mid-day on 25 October.



*Deutsches Afrika Korps*.<sup>1</sup> At this time, Axis reconnaissance aircraft indicated that 700 British tanks were present behind the 8<sup>th</sup> Army's advance.<sup>296</sup> However, since there were no signs of the British armor exploiting their penetration, *General der Panzertruppe* von Thoma decided to stay his hand. *General der Panzertruppe* von Thoma felt that it was best to continue to defend the line which *Generalfeldmarshall* Rommel had laid down before leaving—and hope that General Montgomery's nerve would fail in the bitter fighting that must come. After all, General Auchinleck had failed to press his advantage in July, and the Axis positions and strengths were much greater now. Thus, *General der Panzertruppe* von Thoma surrendered the initiative and accepted a battle of attrition with General Montgomery and the numerically superior 8<sup>th</sup> Army.<sup>297</sup> At this point, neither side was fighting the battle in accordance with their plans. The incidental, partial withdrawals by the Rheinlanders of the 382<sup>nd</sup> Grenadier Regiment and the reinforcement of the main defensive line with reserves combined with support from the 15<sup>th</sup> Panzer Division and the 133<sup>rd</sup> *Littorio* Armored Division had effectively countered General Montgomery's concept of "crumbling." Nevertheless, the 382<sup>nd</sup> Grenadier Regiment had suffered badly. By the end of the day, they had reported the loss of one battalion commander (*Hauptmann* Julius Pieper, I Battalion, plus his adjutant, missing) and three company commanders (from 1<sup>st</sup>, 2<sup>nd</sup> and 9<sup>th</sup> companies).<sup>298</sup> However, both *General der Kavallerie* Stumme and *General der Panzertruppe* von Thoma had stopped the larger local counterattacks that *Generalfeldmarshall* Rommel had intended to eliminate any penetrations of the front.

#### **6.6.7. 15<sup>th</sup> PANZER DIVISION ASSUMES RESPONSIBILITY FOR THE SECTOR OPPOSITE XXX CORPS**

Late that afternoon, the Axis leadership estimated that the Allies would attempt to renew their infantry advance, since no major armored advance had been attempted during the daylight hours. Based on this estimate of the situation, the Axis artillery was directed to begin placing harassing fire on and behind Miteiriya Ridge. At about the same time, some of the infantry from the 164<sup>th</sup> *Leicht Afrika* Division and the 102<sup>nd</sup> *Trento* Division started to infiltrate back to their battle positions that had been vacated earlier in the day. Soon, they began their customary machine gun firing on fixed lines with salvoes of mortar fire directed at the known Allied breach sites west of the ridge.<sup>299</sup> At about 1930, *Generalmajor* von Vaerst was given responsibility for the entire northern sector with the 164<sup>th</sup> *Leicht Afrika* Division placed under his control and the 102<sup>nd</sup> *Trento* Division directed to 'cooperate'.<sup>300</sup>

#### **6.7. ALLIED ARMORED ATTACK, ATTEMPT TO REACH PHASE LINE PIERSON (DUSK, SATURDAY 24 OCTOBER TO DAWN, SUNDAY 25 OCTOBER)**

##### **6.7.1. DEUTCH-ITALIENISCHEN PANZERARMEE REQUESTS THE RETURN OF GENERALFELDMARSHALL ROMMEL**

In the evening, the German high command demanded that the *panzerarmee*'s chief-of-staff, *Oberstleutnant* Siegfried Westphal, report within the hour, as to whether this Allied action was a reconnaissance in force, or a full-scale attack. *Oberstleutnant* Westphal replied, "Undoubtedly the long-expected full-scale offensive. *General Stumme* has been killed in action. Immediate return of *Generalfeldmarshall* Rommel is absolutely essential."<sup>301</sup> Finally, shortly before midnight, *Generalfeldmarshall* Rommel received a call from the Hitler, requesting him to arrange to return to Africa. That the 8<sup>th</sup> Army, in a single night, could breach the thickly-held northern portion of the front and position itself in relative security on Miteiriya Ridge with infantry, armor, artillery and antitank guns, was inconceivable to *Generalfeldmarshall* Rommel. He had expected that he would have at least two days' warning by the movement of Allied armor and supporting infantry.<sup>302</sup> The ailing *Generalfeldmarshall* knew it was a desperate situation in Africa. He had been told in the reports from his officers that supplies had fallen far short of his minimum requirements. However, just how bad the supply situation really was he would not learn until later.<sup>303</sup>

##### **6.7.2. X CORPS PLANS ITS SECOND ATTEMPT TO REACH PHASE LINE PIERSON**

In an attempt to reach his objectives along Phase Line Pierson, and affect the breakthrough that was the object of Operation Lightfoot, General Lumsden planned his next attack with strong artillery support, as ordered by General Montgomery (Map 18). The plan called for the two armored divisions and the 9<sup>th</sup> Armoured Brigade (still

<sup>1</sup> The British official history, *The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV*, claims that the command of the *panzerarmee* passed to *General der Panzertruppe* von Thoma at 1200. However, the official history fails to cite its source and the claim can not be reconciled with available Axis documents.

under the command of the 2<sup>nd</sup> New Zealand Division) to advance by night through the 2<sup>nd</sup> New Zealand Division and the 51<sup>st</sup> Highland Division on its right flank. General Lumsden ordered the 10<sup>th</sup> Armoured Division and the 9<sup>th</sup> Armoured Brigade to “*deploy clear of the enemy minefields, and, linking up with the 1<sup>st</sup> Armoured Division on their right, be prepared to meet an attack by enemy tanks.*”<sup>304</sup> They were to be supported by a heavy barrage consisting initially of counter-battery concentrations fired by some 300 guns from 2200 to 2215 on a very wide frontage. These were to be fired by two field artillery regiments of the 51<sup>st</sup> Highland Division, the three New Zealand ones, four of the 10<sup>th</sup> Armoured Division, and two of the 1<sup>st</sup> South African Division on the left flank, as well as by XXX Corps’ medium guns, a total of about 260 25-pounders, 32 4.5” guns, and 16 5.5” guns. In addition, the Wellington medium bombers of the 205<sup>th</sup> Group were tasked with attacking the known Axis armor concentrations.<sup>305</sup> In the 2<sup>nd</sup> New Zealand Division sector, the artillery concentrations were to be followed for an hour by a far more concentrated creeping barrage than that of the previous night. This one would lift 200 yards (183 meters) every five minutes.<sup>306</sup>

### 6.7.3. ROYAL ENGINEERS, 10<sup>th</sup> ARMoured DIVISION

Earlier in the day, Lieutenant-Colonel McMeekan, the 10<sup>th</sup> Armoured Division’s Chief of Royal Engineers had finally located his remaining Scorpions near the original line of departure. “*I saw our “Scorpions,” or rather the three, out of the original six, which had retained their mobility. Their officer explained that one tank had been knocked out, and two damaged. The others needed repair, but he hoped to get them going in a few hours. Carefully noting his location, I told him to stay put, and promised to send orders when I knew the next plan.*” For the attack planned for that night, Lieutenant-Colonel McMeekan decided to use the 2<sup>nd</sup> and 6<sup>th</sup> Field Squadrons and reinforce them with the remaining Scorpions in support of the planned advance to Phase Line Pierson. The Minefield Task Force of the prior night would not be used; instead, both field squadrons would be attached to their supported brigades and responsible for their own breaches. Before the 10<sup>th</sup> Armoured Division’s orders group broke up at 1620, Lieutenant-Colonel McMeekan promised Brigadier Kenchington (commanding 24<sup>th</sup> Armoured Brigade) to provide a troop of three Scorpions to the 6<sup>th</sup> Field Squadron as well as an additional sapper troop from the 3<sup>rd</sup> Field Squadron. He also coordinated with Brigadier Custance (commanding 8<sup>th</sup> Armoured Brigade) to provide any remaining Scorpions to help the 2<sup>nd</sup> Field Squadron. The 2<sup>nd</sup> Field Squadron was tasked with the very simple but dangerous mission of proofing the two existing breaches on Boat and Ink tracks, which he suspected had been sealed off at the western end by the Axis. Lieutenant-Colonel McMeekan continues, “*It was obvious that the “Scorpions” might be the perfect answer, as they could be lined up under the bank which had sheltered us and given an exact distance and bearing on which to flail, covered by a terrific concentration of artillery fire. By the time I left, the “Scorpions” had not yet arrived to join 2 Squadron in answer to my message. On the way back I looked for them, but could not see them where I had left them. It was dusk, and the clouds of dust reduced visibility to a few yards, so I thought I must have missed them on the way. On arrival at H.Q., however, I found that a D. R. (Dispatch Rider) had also failed to find them and that wherever they were they had not received my order. It was now dark, and although we phoned everyone we could think of, we had no news of them until about zero hour, when somebody said he had seen them four miles back at Alamein Station during the afternoon.*” So the Royal Engineers in the two field squadrons were forced to proceed without them.<sup>307</sup>

### 6.7.4. 6<sup>th</sup> NEW ZEALAND BRIGADE SUPPORT TO X CORPS

Although the X Corps plan for the attack after dark did not directly involve the New Zealand infantry, the New Zealand sappers were required to breach a lane through the same minefield on the forward slope of Miteiriya Ridge that the 8<sup>th</sup> Field Company had been ordered not to attempt in daylight earlier that morning. The plan required Brigadier Gentry’s 6<sup>th</sup> Brigade to mark Route ‘A’ as far as the edge of the minefield, where the New Zealand sappers would take over. This lane was near the inter-brigade boundary and was for the passage of the New Zealander’s Divisional Cavalry Regiment and the 9<sup>th</sup> Armoured Brigade.<sup>308</sup> The lane, through the minefield, had to be breached, lighted and marked by 2130, that is, half an hour before the guns opened up. The task was assigned to No. 1 Section, 6<sup>th</sup> Field Company (Lieutenant Morgan). Meanwhile, the rest of Major Woolcott’s 6<sup>th</sup> Field Company, (less No. 3 Section which did not report back until the next day, No. 2 Section had already returned) was dispersed near a British tank regiment, or rather the tanks had moved in on the sappers to the latter’s intense discomfort, for Axis gunners had the range.<sup>309</sup>







**6.7.4.1. 26<sup>th</sup> INFANTRY BATTALION SECTOR.** Just before the artillery barrage was scheduled to begin, Lieutenant-Colonel Fountaine, commander of the 26<sup>th</sup> Infantry Battalion learned, to his consternation, that the opening line of the barrage lay approximately where his A and C companies were dug in. Messages were sent to all three companies ordering them to retire to the ridge, as quickly as possible, since the guns were to open fire at 2200. Runners dashed out from each company headquarters and the platoons were soon on the move. Captain Horrell's C Company was the slowest to redeploy. Consequently, Nos. 13 and 15 Platoons were caught in the barrage and quickly became disorganized. The rest of the troops were not much better off for the forward slope had become a mass of tanks and trucks. At this point, the Axis artillery also opened fire and shells were exploding all around. The darkness added to the confusion. The battalion's officers found it almost impossible to retain any formation and they continued back to the ridge with whatever men they could find.<sup>i</sup>

**6.7.4.2. 6<sup>th</sup> FIELD COMPANY.** Before the attack, Sapper Lieutenant Morgan went forward in one of the tanks. Shortly before dusk, No. 1 Section (6<sup>th</sup> Field Company), commanded by Major Woolcott in Lieutenant Morgan's absence, set out to locate Lieutenant-Colonel Fountaine's 26<sup>th</sup> Infantry Battalion headquarters in whose area the breach was to be made. It took some time before the infantry battalion headquarters could be located; consequently, the sappers began their mission much later than had been intended. Major Woolcott left Sergeant Johnnie Lawrence to get the work started, while he went ahead with the 'recce' party, but he had not gone far when he was mortally wounded by a booby trap or an S-mine. Sergeant Lawrence described the situation: *"A party of the boys carried Major Woolcott back to the infantry lines and once more we attempted to get cracking on the gap. Unfortunately the explosion of the booby trap awakened a Jerry machine gunner somewhere out ahead of us and he kept us pinned to the ground by sporadic bursts of fire in the direction from which he had seen the flash. We did make a little progress in spite of this bloke but it was not until the battalion machine gunners opened up at him and silenced him that we were at all happy about things particularly as 2200 hrs was fast approaching. I cannot remember much about the actual clearing of the gap except that we were still not through when our own artillery started their barrage. We had many anxious moments before the last marker lamp was placed in position but, fortunately, no casualties due to our own guns. There is one thing that stands out most vividly in my mind and that is the splendid manner in which the men rallied round and pressed on with the job in spite of all the mishaps we encountered. Had they faltered at all we would not have made it."* The section soon took four more casualties, bringing the company's total to fourteen.<sup>310</sup>

Sergeant Lawrence continued: *"We had just seen the leading tanks through our gap in the minefield. And incidentally, breathed a heartfelt sigh of relief that we had not missed any mines, when the Jerries started a bombing raid. One of their first bombs started a fire among the trucks and tanks and from then on things got pretty hot. We had finished our job and there was no sense in hanging around in such unhealthy surroundings so we set off for our transport."* For his courage, Sergeant Lawrence was awarded the Distinguished Conduct Medal.<sup>ii</sup>

#### **6.7.5. BRITISH 10<sup>th</sup> ARMoured DIVISION PLAN IN SUPPORT OF THE X CORPS ATTACK**

General Gatehouse's mission was to gain Phase Line Pierson, which ran along another low-lying ridge, called El Wishka, which rose only 5 meters above the surrounding desert. To accomplish this, he planned for the 24<sup>th</sup> Armoured Brigade to attack on the right (on Bottle Track), after passing through the breach in the sector of the

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<sup>i</sup> Indeed, it was not until midnight that the company commanders were able to locate their battalion headquarters from amongst the confusing lines of vehicles and tanks and had rounded up most of their men. By then, although No. 15 Platoon was still missing, the rest of the men were vainly trying to dig holes along the reverse slope and crest of the ridge. It turned out that No. 15 Platoon had moved passed the 26<sup>th</sup> Infantry Battalion headquarters in the darkness and confusion, eventually reaching the area of the 6<sup>th</sup> Brigade headquarters. 26 Battalion, pages 199-200.

<sup>ii</sup> In part, Sergeant Lawrence's citation read: *"After his field company commander had been fatally wounded SERGEANT Lawrence immediately assumed control, rallied the men and pushed on with the work. When the artillery fire came down on the minefield in preparation for the advance of the armour, the gap was still incomplete. Under the barrage and the enemy fire SERGEANT Lawrence encouraged and directed his men and completed the gap just in time to pass the advancing tanks through. It was in considerable measure due to his vigorous leadership and gallant example that the gap was completed and lighted to allow Div Cav and 9 Armd Bde to move through without delay or hindrance."* New Zealand Engineers, Middle East, pages 357-358.

5<sup>th</sup> Brigade's 21<sup>st</sup> Infantry Battalion and cutting its own breach through another minefield known to be further west. Brigadier Kenchington's 24<sup>th</sup> Armoured Brigade (comprised of the 41<sup>st</sup>, 45<sup>th</sup> and 47<sup>th</sup> battalions of the Royal Tank Regiment) was supported by the 5<sup>th</sup> Royal Horse Artillery Regiment, the 11<sup>th</sup> Battalion of the King's Royal Rifle Corps and the sappers of the 6<sup>th</sup> Field Squadron. On the left, General Gatehouse planned for Brigadier Neville Custance's 8<sup>th</sup> Armoured Brigade to attack toward El Wishka Ridge, using Hat, Boat, and Ink tracks. The 8<sup>th</sup> Armoured Brigade was still composed of the Sherwood Rangers Regiment, the Staffordshire Yeomanry Regiment and the 3<sup>rd</sup> Battalion, Royal Tank Regiment. They were supported by the 1<sup>st</sup> Royal Horse Artillery Regiment, the 1<sup>st</sup> Buffs (1<sup>st</sup> Battalion, Royal East Kent Regiment) and the sappers of the 2<sup>nd</sup> (Cheshire) Field Squadron. It was also proposed that the 133<sup>rd</sup> Lorried Infantry Brigade, supported by the 104<sup>th</sup> Royal Horse Artillery Regiment, should relieve the 5<sup>th</sup> Brigade and the New Zealanders follow the tanks of the 10<sup>th</sup> Armoured Division in order to consolidate the ground won by the tanks. This would allow the veterans of the 5<sup>th</sup> Brigade to follow the 9<sup>th</sup> Armoured Brigade in an exploitation role. Because of doubts about the operation, General Freyberg delayed the relief. In explaining the situation to General Leese shortly after dusk, he said bluntly that the 10<sup>th</sup> Armoured Division was being commanded from too far back and that it was not '*properly set up*' for the attack.<sup>1</sup>

By dusk, the eastern side of Miteiriya Ridge had become quite crowded as the New Zealanders brought up supplies while the units for the attack that night attempted to assemble. By this time, the 10<sup>th</sup> Armoured Division had about 250 tanks behind the ridge. Men and vehicles seemed to fill every available square meter of ground between the minefields and, at times, completely blocked any movement through the breach lanes behind the ridge.<sup>311</sup>

Before General Gatehouse's tanks could attack, however, the sappers would have to breach more lanes through the Axis minefields. This would be especially difficult for the 24<sup>th</sup> Armoured Brigade, as their axis of advance from their assembly area to their line of departure cut diagonally across the existing lanes in the 5<sup>th</sup> Brigade sector. This direction of movement to the frontline was necessary to support General Montgomery's requirement that the two armored divisions of X Corps be able to link up on Phase Line Pierson. The task of clearing this route fell to the Royal Engineers of the 6<sup>th</sup> Field Squadron.<sup>312</sup>

**6.7.5.1. 2<sup>nd</sup> (CHESHIRE) FIELD SQUADRON, ROYAL ENGINEERS.**<sup>313</sup> During the daylight hours of 24 October, the 8<sup>th</sup> Armoured Brigade claimed over forty hostile tanks knocked out. Of this, the Staffordshire Yeomanry Regiment claimed seventeen tanks plus two additional guns, at a cost of two heavy tanks and nine Crusaders (as mentioned earlier).<sup>314</sup> For the upcoming attack by the 10<sup>th</sup> Armoured Division, Brigadier Custance planned to advance with his three armored regiments (and their supporting arms) abreast. The brigade was arrayed along Miteiriya Ridge with the Staffordshire Yeomanry Regiment on the right (using Ink Track), the Sherwood Rangers Regiment in the center (using Boat Track), and the 3<sup>rd</sup> Battalion, Royal Tank Regiment on the left (using Hat Track).

That evening, at the 8<sup>th</sup> Armoured Brigade's Orders Group, Major Jack Perrott learned from Brigadier Custance that his sappers were responsible for providing three 16 yard (14.7 meter) wide breaches, one for each of the brigade's armored regiments. Fortunately, Major Perrott's 2<sup>nd</sup> (Cheshire) Field Squadron, Royal Engineers, was a well-trained unit with high morale. He allocated one troop of sappers to each breach. These breaches were to be made by completing and widening the existing breaches on Ink, Boat, and Hat tracks through the 6<sup>th</sup> New Zealand Brigade sector. For security reasons, the reductions could begin no sooner than last light (1930) and had to be completed by 2200, when the armor was to pass through. This straightforward task was quite dangerous. The Axis defenders now knew the direction of these routes. The ends of the existing gaps, cut earlier in the day, were now back in Axis territory and had probably been re-sown with mines, with weapons pre-sighted to cover them. Nevertheless, Major Perrott set about enthusiastically preparing his unit for their mission. Ink Track was assigned to the troop of Andrew Ramsay and Geoffrey Kneale. Boat Track was assigned to the troop of Captain F. G. (Griff)

<sup>1</sup> The basis of this complaint lay in the fact that, though Gatehouse maintained a tactical or forward headquarters, this was apparently mobile and very hard to find or reach by wireless, so that the only reliable channel of communication was through the headquarters of 10 Armoured Division, well to the rear and manned by a staff often out of touch with the latest developments and unable to make valid decisions without relaying messages to their commander. There is evidence that Gatehouse visited both his brigades in the New Zealand sector during the late afternoon or evening, but in failing to keep in constant personal touch with Freyberg he showed a lack of appreciation that the operations of 9 Armoured Brigade should have been closely coordinated with those of his own armour. *Alam Halfa and Alamein*, pages 305-306. Question 12: Why not use the 133<sup>rd</sup> Lorried Infantry Brigade, already assigned to the 10<sup>th</sup> Armoured Division, as part of the division's attack to Phase Line Pierson?



Caldwell and Philip Holborn. And Hat Track was assigned to the troop of Captain Peter Hattersley and Lieutenant Leslie Sage. Although the 2<sup>nd</sup> Field Squadron had been assigned a company of infantry for protection, they had arrived very late and without any platoon officers. Consequently, Major Perrott felt that they could not be effectively employed and were left out of the operation.

As darkness fell, but before the full moon rose, the three troops of sappers of the 2<sup>nd</sup> Field Squadron set out to breach the minefields. The first task was to conduct a reconnaissance of the route and accurately determine the situation. Major Perrott and Captain Caldwell walked southwest on Boat Track, near the boundary of the 5<sup>th</sup> and 6<sup>th</sup> New Zealand Brigades, and over the crest of Miteiriya Ridge. They had proceeded down the forward slope and passed the New Zealand infantry, when suddenly, ten shadowy figures, rifles in hand, rose from the ground just a short distance ahead of them. Major Perrott said in a low voice, *'Take it quietly, Griff. They must be Jerries. Turn round and walk back casually.'* As the two officers did so, they expected a hail of bullets at any moment, but, fortunately, none came and they were able to make good their escape.

On Hat Track (near the left flank of Lieutenant-Colonel Fountaine's 26<sup>th</sup> Infantry Battalion), Captain Hattersley was no so lucky. He was conducting his reconnaissance with Sapper Heath, when a group of shadows rose from the ground (just as had happened to Major Perrott) about 30 meters ahead. Captain Hattersley grabbed Sapper Heath's 'Tommy' gun, dropped to a knee and opened fire. The shadows returned fire, and the Captain was shot in the head. He died in the arms of Sapper Heath, who was also wounded and taken prisoner by the Germans (apparently from the 5<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment). Sapper Heath violently protested that a doctor should be found to attend to his troop commander, but to no avail. He was taken back to a covered defensive position occupied by some Germans and one Italian who periodically entertained the group with an accordion.

When the reconnaissance team failed to return, a second team was sent forward, but the now alert Rheinlanders had sited an antitank gun and machine guns to enfilade the route. These opened fire on the second reconnaissance party. At 1930, the Bren carriers of B Company, 1<sup>st</sup> Battalion, Royal East Kent Regiment had been sent forward to assist the sappers. At 2100, the sappers abandoned their efforts to breach the minefield due to heavy Italian fire. Next, they discussed the matter with Lieutenant-Colonel 'Pete' Pyman, commander of the 3<sup>rd</sup> Battalion, Royal Tank Regiment, who was assigned this route. Lieutenant-Colonel Pyman then notified the 8<sup>th</sup> Armoured Brigade of his situation. At 2130, the headquarters of the 8<sup>th</sup> Armoured Brigade gave permission for the 3<sup>rd</sup> Battalion, Royal Tank Regiment to cancel the attack on this axis and make coordination to reroute the regiment to Boat Track and follow the attack of the Sherwood Rangers Regiment. The redeployment began fifteen minutes later.<sup>315</sup>

Meanwhile, in the center of the New Zealand sector, Captain Caldwell's troop was making excellent progress on Boat Track for the Sherwood Rangers Regiment, in part, because no S-mines were encountered, only Tellermines. The troop under Ramsay made similar progress on Ink Track to the right, for the Staffordshire Yeomanry Regiment. As the work neared completion, Major Perrott inspected both routes and found the traffic already jammed up as the armored regiments attempted to press forward.

#### **6.7.5.2. BRITISH 8<sup>th</sup> ARMoured BRIGADE**

In preparation for the attack, the tanks of the brigade formed up in a column with two vehicles abreast in the narrow breach lanes, which had been widened to 16 yards (14.7 meters) by the sappers earlier in the day, and waited for the sappers to complete their work. At 2200, the barrage began and the armor on Boat and Ink tracks started to move forward. However, at around 2215, Axis bombers appeared and dropped illumination flares which silhouetted the long columns of transport and tanks of the Sherwood Rangers Regiment that were closed up nose to tail to pass through the narrow breach in the minefield along Boat Track over the crest of the ridge. Many of these vehicles contained troops, petrol, and ammunition. As the troops dove for cover, the bombs began to fall near the vehicles of the Sherwood Rangers Regiment, the 1<sup>st</sup> Battalion, Royal West Kent Regiment (the 'Bufs'), and Brigadier Custance's brigade headquarters. One stick of bombs fell just in front of the regimental command tank of the Sherwood Rangers Regiment, wounding two officers and six men, while blowing the track off of the vehicle.<sup>316</sup> The bombs caught a number of thin-skinned vehicles, on the left of the sector, and within a few minutes about twenty-two of the fuel and ammunition trucks were ablaze. All of the headquarters vehicles of the Bufs were destroyed. Some of these bombs, which reportedly contained flame oil, proved very effective against the thin-skinned trucks. The burning vehicles also attracted heavy artillery fire from the Axis as well as heavy small arms



fire from the nearby Rheinlanders of the II Battalion, 382<sup>nd</sup> Grenadier Regiment, greatly adding to the confusion. The blazing wreckage blocked the narrow breach while lighting up the whole area for further air attack. There were many casualties among the troops in the vehicles. Major Perrott, Commander of the 2<sup>nd</sup> Field Squadron, Royal Engineers, described the scene as “*the most enormous crackling furnace, which lit the desert up for a radius of two miles all around. The gap was illuminated like a street with modern lighting and everything in it was silhouetted to the enemy.*” Consequently, the Sherwood Rangers Regiment and the 3<sup>rd</sup> Battalion, Royal Tank Regiment was ordered to disperse.

Those trucks and tanks that were able to break column and scatter became a real threat to the New Zealanders in the nearby shallow slit trenches. Allied anti-aircraft guns began firing hundreds of rounds at the Axis aircraft that were attracted by the blazing trucks and aided by the brilliant light of the now risen full moon.<sup>317</sup> Anti-aircraft shells were going up and their fragments coming down in all directions. Many of the destroyed trucks continued to burn for the rest of the night. The infantry of Brigadier Lee’s 133<sup>rd</sup> Lorried Infantry Brigade also took significant casualties and the Regimental Aid Post (RAP) staff of the 26<sup>th</sup> New Zealand Infantry Battalion had to forego their chance to sleep in order to tend to their wounded. At one point, Lieutenant-Colonel Fountaine, Commander of the 26<sup>th</sup> Infantry Battalion seriously considered withdrawing his men farther back. Even those in the shallow slit trenches were at risk as his men were forced to continually dodge out of the way of the trucks, tanks, and armored cars of the 8<sup>th</sup> Armoured Brigade that were attempting to escape the Axis attack. Although Lieutenant-Colonel Fountaine expected to find heavy casualties in his 26<sup>th</sup> Infantry Battalion, a check revealed only two—one killed and another wounded. However, one of the sticks of bombs had caught No. 9 Platoon, 27<sup>th</sup> New Zealand Machine Gun Battalion, which had been ordered forward from the 24<sup>th</sup> Infantry Battalion to support the 26<sup>th</sup> Infantry Battalion and had dispersed on clear ground in the area. One of their gun trucks was destroyed and six men were killed.<sup>318</sup> Some truck drivers, at the rear of the 8<sup>th</sup> Armoured Brigade’s column, attempted to save their vehicles by driving clear of the inferno, but as several of these promptly ran over mines along the edges of the breaches, they blocked the other end of the route. All totaled, the Allied casualties directly attributable to this incident numbered at least 50 (and probably more), mostly to the 10<sup>th</sup> Armoured Division’s lorried infantry.<sup>319</sup> All those New Zealanders who saw this bombing were, ever afterwards, most insistent that the correct distances between vehicles should be maintained at all times. Fortunately, although the Axis planes remained overhead for several hours, the few aircraft available to the *Luftwaffe* and the *Regia Aeronautica* were incapable of sustaining this bombing attack.<sup>i</sup> Eventually, even the Axis shelling slackened off (around midnight). As a result of the bombing and Axis defensive measures on both Boat and Hat tracks, there were only two routes available to forces attempting to advance through the 6<sup>th</sup> Brigade sector. These were the breach created by the New Zealander sappers along Route ‘A’ in the 26<sup>th</sup> Infantry Battalion sector and the one along Ink Track.

In the 8<sup>th</sup> Armoured Brigade, the Staffordshire Yeomanry Regiment had the best luck on this chaotic night. During their advance over Miteiriya Ridge, this regiment moved along Ink Track down the breach cleared by Ramsay’s troop from the 2<sup>nd</sup> Field Squadron, losing two tanks to mines. The tanks were able to continue their advance to the forward slope of El Wishka Ridge. Here, they met heavy resistance from *Kampfgruppe Sud*.<sup>320</sup> As a result of the chaos in the center of the 2<sup>nd</sup> New Zealand Division’s sector, it took Brigadier Custance and his officers until about midnight to sort out the situation of the 3<sup>rd</sup> Battalion, Royal Tank Regiment and the badly disorganized Sherwood Rangers Regiment. By 0100, the confusion along Boat Track had begun to quiet down.<sup>321</sup> At 0230, the 3<sup>rd</sup> Battalion, Royal Tank Regiment, followed by the Sherwood Rangers Regiment, was ordered by the 8<sup>th</sup> Armoured Brigade to follow the Staffordshire Yeomanry Regiment, using Ink Track.<sup>ii</sup> The 3<sup>rd</sup> Battalion, Royal Tank Regiment commenced their movement at 0330. By 0400, they were finally clear of the last Axis minefield (the following Sherwood Rangers Regiment did not clear this minefield until dawn). By 0500, the 3<sup>rd</sup> Battalion, Royal Tank Regiment had advanced about 3,000 meters (1,000 meters short of the Staffordshire Yeomanry Regiment). By 0530, they were also under heavy fire from *Kampfgruppe Sud* on El Wishka Ridge.

<sup>i</sup> The *Luftwaffe* flew only 107 sorties (of which 69 were fighter) and dropped only a total of 5 tons of bombs on 24 October. *The Rommel Papers*, page 335.

<sup>ii</sup> There is some confusion in the various accounts of this action between Bottle and Ink tracks. Several of these accounts claim that the Staffordshire Yeomanry advanced along Bottle Track. This is not possible. The breach along Bottle Track for the 24<sup>th</sup> Armoured Brigade, due to a breakdown in communications, was not ready for use until 0500 on 25 October. The third breach for the 8<sup>th</sup> Armoured Brigade, as stated by Lieutenant-Colonel McMeekan, was along Ink Track. This narrative reflects this assessment.

### 6.7.6. 2<sup>nd</sup> NEW ZEALAND DIVISION CAVALRY REGIMENT

During the day on 24 October, the 2<sup>nd</sup> New Zealand Division's Cavalry Regiment had concentrated south of Bottle Track (in 5<sup>th</sup> Brigade's sector), along with their small detachment from the 5<sup>th</sup> Field Park Company and some antitank guns. Here, they prepared to continue the advance with the 24<sup>th</sup> Armoured Brigade. However, while in this position, they were heavily bombed and suffered some casualties. After dark, the Divisional Cavalry Regiment and the 3<sup>rd</sup> Hussar Regiment, with other elements from the 9<sup>th</sup> Armoured Brigade, shifted to the center of the 2<sup>nd</sup> New Zealand Division sector. There, they were directed to prepare to advance along the breach to be forced by Sergeant Lawrence and No. 2 Section, 6<sup>th</sup> Field Company through the left side of the 26<sup>th</sup> Infantry Battalion sector. The cavalry's Stuart light tanks, from B and C Squadrons, were to be the first to pass through the breach along Route 'A,' on the left flank of the 10<sup>th</sup> Armoured Division. The cavalry was to act as a screen for the 9<sup>th</sup> Armoured Brigade's heavier tanks. When the cavalry reached the breach, they found that it was under Axis shellfire. As the squadrons passed through, they drove past a Sherman tank which had caught fire right at the mouth of the minefield gap and which was burning so fiercely that its whole steel shell stood out in the darkness as a great glowing beacon for all to see. Naturally, this was an unhealthy place to be.

After passing through the gap along Route 'A,' the squadrons of the Division Cavalry Regiment immediately fanned out in a line facing south-west and began to advance, lengthening their line as they went. The leading troop of Stuart tanks was soon met by heavy antitank and machine gun fire apparently from the surviving elements of the 5<sup>th</sup> and 9<sup>th</sup> companies, II Battalion, 382<sup>nd</sup> Grenadier Regiment and the III Battalion, 61<sup>st</sup> Infantry Regiment. By this time, the II Battalion, 382<sup>nd</sup> Grenadier Regiment had been reduced to three companies with an estimated combined strength of at most 650 men equipped four 5cm PAK38s, three 3.7cm PAK 36s, nine heavy machine guns, twenty-three light machine guns, and six 8cm mortars (and probably significantly less).<sup>322</sup> The III Battalion, 61<sup>st</sup> Infantry Regiment had also been reduced to three companies with an estimated combined strength of at most nineteen officers and 340 men equipped with six 47/32 antitank guns, seven 20mm antitank rifles, six heavy machine guns, sixteen light machine guns, and four 81mm mortars. Lieutenant Poolman, a troop commander, charged straight through the German grenadier company (probably the 5<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment) in front of him, but had gone only a short distance ahead, before he ran into mines. Although, Lieutenant Poolman was still under heavy mortar and machine gun fire, he dismounted and managed to find a way forward. The cavalry also had some trouble with Axis wire entanglements during this advance.<sup>323</sup> They were further delayed by scattered mines. As a result, they lost touch with the lifting barrage. After losing two tanks to scattered mines, C Squadron halted.<sup>324</sup> However, B Squadron pushed on, but they never got more than about 3000 meters as they were enfiladed by murderous fire from Axis tanks and field and antitank guns. The two remaining regiments of the 9<sup>th</sup> Armoured Brigade (still under the control of the 2<sup>nd</sup> New Zealand Division) were supposed to follow the cavalry. However, they were delayed when their path was blocked by a column from the 10<sup>th</sup> Armoured Division (reportedly elements of the Staffordshire Yeomanry Regiment who were lost, and in the wrong breach lane). At 0200, the 3<sup>rd</sup> Hussar Regiment was finally able to lead the 9<sup>th</sup> Armoured Brigade through the last Axis minefield and advance out into the darkness. Although it had been proposed that Brigadier Currie's heavy tanks should use the smaller Stuart tanks of the cavalry to draw fire, this proved to be unnecessary, since anything that moved drew fire, often at point blank range.<sup>325</sup> Soon, the 9<sup>th</sup> Armoured Brigade became involved in some rather wild night firing to the southwest of Miteiriya Ridge. After passing the 9<sup>th</sup> Armoured Brigade forward, the cavalry requested permission to withdraw, but was instructed by General Freyberg to stay out front until dawn.<sup>326</sup> It quickly became evident to the cavalrymen that, to the north, only part of the 10<sup>th</sup> Armoured Division's tank force had been able to pass through the minefield breaches.

### 6.7.7. KAMPFGRUPPE SUD MOVES TO COUNTER THE 10<sup>th</sup> ARMoured DIVISION'S ATTACK

As stated earlier, at about 1930, *Generalmajor* von Vaerst and the 15<sup>th</sup> Panzer Division were given responsibility for the entire northern sector with the 164<sup>th</sup> *Leicht Afrika* Division placed under their control and the 102<sup>nd</sup> *Trento* Division directed to 'cooperate.'<sup>327</sup> By 2340, within an hour and a half of the completion of the Allied barrage, the III Battalion of *Oberst* von Neindorf's 433<sup>rd</sup> Grenadier Regiment (the 164<sup>th</sup> *Leicht Afrika* Division's reserve, see Appendix I for their Order of Battle) had relieved *Hauptmann* Weichsel's II Battalion, 115<sup>th</sup> Panzer Grenadier Regiment and I Battalion, 8<sup>th</sup> Panzer Regiment in the 5<sup>th</sup> New Zealand Brigade sector. This allowed the units of *Kampfgruppe Sud* to return to their initial positions on El Wishka Ridge.<sup>328</sup>



As of 2310, the 15<sup>th</sup> Panzer Division reported to have destroyed 28 tanks and 3 aircraft in exchange for the loss of 20 panzers from the 8<sup>th</sup> Panzer Regiment destroyed so far in the battle. In addition, two battalions (the German I Battalion, 382<sup>nd</sup> Grenadier Regiment and the Italian II Battalion, 62<sup>nd</sup> Infantry Regiment) along with the entire outpost line in the sector was reported to have been destroyed. In the same report, the 15<sup>th</sup> Panzer Division stated that they now had only 44 combat ready panzers, of the 128 with which they had begun the battle (which would seem to imply that 64 more were on-hand but not operational).<sup>329</sup>

As the night of 24 October wore on, the British night-bombers concentrated on the three *kampfgruppen* of the 15<sup>th</sup> Panzer and 133<sup>rd</sup> *Littorio* Armored divisions, dropping over 135 tons of bombs during this period. Three of the *panzerarmee*'s convoys were caught on the move and several large fires were started.<sup>330</sup> In the early hours of 25 October, the III Battalion, 433<sup>rd</sup> Grenadier Regiment reported that about 60 Allied tanks had penetrated their position in the main line of resistance.<sup>331</sup> This left the II Battalion, 115<sup>th</sup> Panzer Grenadier Regiment, in the second line of defense to face this new armored penetration at dawn. In the sector of the 6<sup>th</sup> New Zealand Brigade, the surviving Rheinlanders of the II Battalion, 382<sup>nd</sup> Grenadiers had reformed a short distance to the west of Miteiriya Ridge (apparently around the position of their reserve unit, apparently the 9<sup>th</sup> Company) and were continuing to resist. Meanwhile, to their right, the Sicilians of Captain Attilio Caimi's III Battalion, 61<sup>st</sup> Infantry Regiment, had been reinforced by their sister battalion, the II Battalion, 61<sup>st</sup> Infantry Regiment, which had moved up from the 102<sup>nd</sup> *Trento* Division's reserve. At midnight, three companies from the lightly armed II Battalion, 61<sup>st</sup> Infantry Regiment came up (with rations) across ground occupied by the advance guard of the Allies. They had begun the battle with about twenty-five officers and 450 enlisted in four companies equipped with nine 20mm antitank rifles, twelve heavy machine guns, twenty-six light machine guns, and four 81mm mortars. In their move forward to reinforce the III Battalion, 61<sup>st</sup> Infantry Regiment, they about lost 60% of their strength in a desperate attempt to drive back the Allies and were badly shaken from the experience. Nevertheless, they were a welcome reinforcement as the Sicilians continued to hold their positions opposite Lieutenant-Colonel Bonifant's 25<sup>th</sup> New Zealand Infantry Battalion and the Capetown Highlanders (see Map 18).

#### 6.7.8. BRITISH 9<sup>th</sup> ARMoured BRIGADE

At 1800 (24 October), the badly mauled Royal Wiltshire Yeomanry Regiment, now under Major Gibb, had been withdrawn by Brigadier Currie and directed to turn over their few remaining tanks to other units of the brigade. They were to return to their assembly area, refit with Crusader tanks, and prepare to re-enter the fight.<sup>332</sup> Meanwhile, at 1900, the rest of the brigade withdrew about two kilometers to the 'B 1' Echelon to rearm and refuel. The brigade then moved forward at 2300 hours.<sup>333</sup> For the up-coming night attack, Brigadier Currie planned to cross Miteiriya Ridge through the 26<sup>th</sup> Infantry Battalion sector with the fresh 3<sup>rd</sup> Hussars Regiment leading, followed by the Royal Warwickshire Yeomanry Regiment. They were to follow the 2<sup>nd</sup> New Zealand Division Cavalry regiment through Sergeant Lawrence's breach on Route 'A.' Then, in conjunction with the cavalry, they were to attack, behind a lifting barrage fired by the New Zealand Division Artillery to Phase Line Pierson along El Wishka Ridge. There, they were to establish a defense oriented south and tied into the 10<sup>th</sup> Armoured Division's expected new positions along Phase Line Pierson on their right and, on their left, back to the 6<sup>th</sup> New Zealand Brigade on Miteiriya Ridge, thus screening the 10<sup>th</sup> Armoured Division's southern flank.<sup>334</sup>

However, the movement of the 9<sup>th</sup> Armoured Brigade over the ridge was blocked by elements of the 8<sup>th</sup> Armoured Brigade (reportedly from the Staffordshire Yeomanry Regiment), who were mistakenly moving down Route 'A,' through the 26<sup>th</sup> Infantry Battalion sector rather than Ink Track. The advance through the minefields proved to be much more difficult than was expected. Finally, at about 0200, Brigadier Currie had to personally lead the advance through the congestion and confusion on Miteiriya Ridge. One group of his tanks was assisted across the ridge by New Zealand machine gunners who fired a special barrage of some 12,000 rounds and also replaced missing marking lights in the minefield breach and guided the tanks through. By now, the lifting artillery barrage had long since been completed and the tankers were on their own. The Lieutenant-Colonel Farquhar's 3<sup>rd</sup> Hussar Regiment led the way, followed by Lieutenant-Colonel Guy Jackson's Royal Warwickshire Yeomanry Regiment as they passed through the last Axis minefields. The 9<sup>th</sup> Armoured Brigade was able to advance about 1800 meters, overrunning a number of positions belonging to the survivors of the II Battalion, 382<sup>nd</sup> Grenadier Regiment and capturing many prisoners.<sup>335</sup> The Royal Warwickshire Yeomanry Regiment captured one officer and 15 enlisted men from the 9<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment (plus another 250 Italians, probably Sicilians from the II and III battalions of the 61<sup>st</sup> Infantry Regiment, later in the morning). Towards dawn, an Axis antitank gun opened up, destroying five tanks from the 3<sup>rd</sup> Hussars Regiment, while scattered antitank mines claimed another



three tanks of the 3<sup>rd</sup> Hussars Regiment as well as three scout cars from the reconnaissance troop of the Royal Warwickshire Yeomanry Regiment. This resulted in one killed and three wounded during this advance.<sup>336</sup>

Long before daylight, Brigadier Currie of the 9<sup>th</sup> Armoured Brigade was in touch with 2<sup>nd</sup> New Zealand Divisional Headquarters, making his now familiar complaint that the 4<sup>th</sup> Field Regiment's observation posts were not forward. The Chief of Royal Artillery, Brigadier Weir, assured General Freyberg that they would certainly be with the 9<sup>th</sup> Armoured Brigade at first light, but Brigadier Currie would not accept this. In fact, the observation posts were on the appointed ground, but there had been some delay in establishing contact with the British tankers. This was not surprising in view of the situation. However, the delay did not stop the forward observers from engaging any likely looking targets and the 4<sup>th</sup> Field Regiment guns were soon active.<sup>i</sup>

Although the battle for El Wishka (Phase Line Pierson) lasted all night, by daylight, the 9<sup>th</sup> Armoured Brigade still found itself facing the well-sited tanks, antitank guns and field guns of *Oberst Teege's Kampfgruppe Sud* (Table 24). Early that morning, Brigadier Currie's brigade was arrayed in low ground with the 3<sup>rd</sup> Hussars Regiment on the right, in contact with the 8<sup>th</sup> Armoured Brigade's Staffordshire Yeomanry Regiment. This was the only unit from the 8<sup>th</sup> Armoured Brigade that had finally been able to reach the slope of El Wishka Ridge. As stated earlier, they soon lost two tanks to mines and came under heavy antitank fire from El Wishka Ridge. During this engagement, 'A' Squadron of Lieutenant-Colonel Farquhar's 3<sup>rd</sup> Hussars Regiment had a rough time with their thinly armored Crusaders. After Major Clarke and Sergeant Major Rodwell had both been killed, Lieutenant-Colonel Farquhar ordered the rest of A Squadron back behind Miteiriya Ridge, while the remainder of the regiment stayed forward. When there was an impromptu truce for both sides to cook up their lunch, Lieutenant-Colonel Farquhar took advantage of the opportunity to bring 'C' Squadron up to full strength from the remaining tanks in 'B' Squadron (which had lost four during the night).<sup>337</sup> The Royal Warwickshire Yeomanry Regiment was on the left of the 3<sup>rd</sup> Hussars Regiment and oriented south.<sup>338</sup> Lieutenant-Colonel Guy Jackson's Royal Warwickshire Yeomanry Regiment had several tanks hit including one Sherman which literally had its turret blown off. John Lakin, of the Royal Warwickshire Yeomanry Regiment, watched at dawn as the tanks of the Staffordshire Yeomanry Regiment *'go up in sheets of flame one by one, just as if someone had lit the candles on a birthday cake. It was a scene I shall never forget'* (Photo 81). The Staffordshire Yeomanry Regiment (8<sup>th</sup> Armoured Brigade) quickly lost ten tanks, and their commander, Lieutenant-Colonel Eadie ordered a short withdrawal. Two days of fighting had now cost him 13 of 15 Crusaders and 14 of 28 Shermans and Grants.

During this advance to Phase Line Pierson, the 9<sup>th</sup> Armoured Brigade was supported by the New Zealanders of the 31<sup>st</sup> Anti-Tank Battery. Troop A was with the leading tanks at first light, and soon came under heavy fire. The gun crews had to take up whatever covered positions were available. Gun A1 was lucky enough to come upon a pit dug to shelter a truck and gained excellent cover. The others did not fare so well. A mortar shell soon burst near gun A3 and wounded all but one of its crew. Gun A4 also found good cover, but several *portees* from a British unit were nearby, attracting a lot of fire and suffering many casualties. Several wounded men came to the gun A4 position, followed by the driver of A4 with blood flowing down his face. At one point, a British officer drove up, halted his jeep. Almost at once, he was mortally wounded by a shell that also slightly wounded the sergeant of gun A4. This gun position soon became a shambles. Later in the day, as the tanks withdrew to hull-down positions on the ridge, Lieutenant Abel was ordered to withdraw A Troop. It was a formidable task, but he set about

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<sup>i</sup> Brigadier Currie complained to General Freyberg that his was the only armored brigade without its own integral RHA (Royal Horse Artillery) regiment and a report by his brigade underlined the point: *"It cannot be over-stressed that only the best and quickest thinking officers will ever succeed in this type of occasion, and it is no use thinking any field regiment can take on the job at a moment's notice . . . When artillery support is expected and fails to materialize, it is a very serious matter."* The implications for the 4<sup>th</sup> Field Artillery Regiment are clear, but they are unjust. The two regiments of the 8<sup>th</sup> Armoured Brigade that got through that night were not saved from an even worse fate than that of the 9<sup>th</sup> Armoured Brigade by their Royal Horse Artillery regiments. Brigadier Currie's tanks in fact received splendid support this day, not only from the 4<sup>th</sup> Field Artillery Regiment but also from the rest of the New Zealand Division Artillery. The trouble was that the task they had been given of breaking through a hostile gun line was one which infantry attacking by night could have done far better. A far more serious matter was the lack of understanding between the three armored formations that staged the attack: the two divisions and Brigadier Currie's brigade, all of which were supposed to co-operate closely in effecting a breakthrough. However, the real problem was even deeper than this. The effort to exploit a largely successful infantry attack with armor almost completely divorced from infantry and supported, if at all, only by artillery indicated that Eighth Army thinking was still far behind that of the *Afrika Korps*. The Germans would not have attempted either operation without tanks, infantry, and engineers in close and constant co-operation. The armored brigade needed far more than the support of the 4<sup>th</sup> Field Artillery Regiment to make any real headway. *2<sup>nd</sup> New Zealand Divisional Artillery*, pages 390-391.

it boldly and managed to bring back all of the wounded and the three manned guns. Then he drove his pick-up back to gun A3, hooked it up under fire, and towed it back. For this, he was awarded the Military Cross.<sup>339</sup>

Troop B, with two guns went into action against a minor Axis counter-thrust, during which one of the guns, under Sergeant Dilly, knocked out a tank. In Troop C, gun C1, a *portee*, suffered a direct hit, killing two gunners. The *portee* following close behind had two men wounded by the same explosion. By the end of the morning, only gun C3 remained in action. At first light, D Troop, supporting the tanks of the Royal Warwickshire Yeomanry Regiment, found that three of their *portees* had wandered deep into a minefield and had to wait for sappers to clear a lane for them before they could move.<sup>340</sup>



**PHOTO 81. Tanks of the Staffordshire Yeomanry Burn in Front of El Wishka Ridge, Victims of the guns of *Kampfgruppe Sud*, Dawn, 25 October**



**PHOTO 82. Miteiriya Ridge, 25 October**



In the increasing daylight, the entrenched firepower of *Kampfgruppe Sud* was soon causing the Allies heavy losses. As a result, the tankers chose to withdraw. The New Zealand Cavalry Regiment experienced its heaviest fighting at this point as the heavy tanks drew back.<sup>i</sup> The cavalry regiment's losses amounted to 5 tanks (two on mines) and 4 carriers for the night. Two sergeants and four troopers were killed. Four others later died of wounds. In addition, about twelve more were wounded. The cavalry could not claim much in compensation, only one antitank gun, one heavy mortar, and some infantry eliminated, but no prisoners.<sup>341</sup> However, that morning C and D companies of the 25th Infantry Battalion passed back more than a hundred German and Italian prisoners taken by other armor units during the night of 24 October.<sup>342</sup> By the time the 9<sup>th</sup> Armoured Brigade was withdrawn on General Freyberg's order in the late afternoon (about 1700), they had only 36 tanks left in operational condition. They had begun Operation Lightfoot with 122 tanks. However, all but eleven of their damaged tanks were recoverable. In exchange, they had taken 200-300 prisoners and reported to have knocked out 13 tanks and 10 guns, during the night attack, of which four tanks (including one Panzer II) and several antitank guns were claimed by the Royal Warwickshire Yeomanry Regiment. In exchange, Lieutenant-Colonel Jackson's regiment reported losing one killed and ten wounded on this day.<sup>343</sup>

#### 6.7.9. 220<sup>th</sup> PIONEER BATTALION, 164<sup>th</sup> *LEICHT AFRIKA* DIVISION

On the night of 24 October, German pioneers from the 1<sup>st</sup> and 2<sup>nd</sup> companies of *Hauptmann Streitz*' 220<sup>th</sup> Pioneer Battalion, emerged from their defensive positions and began hastily laying new mines to the west of Miteiriya Ridge. Under the protection of their artillery and antitank guns, they emplaced 600 antitank mines that night in the 5<sup>th</sup> New Zealand Brigade sector.<sup>ii</sup>

#### 6.7.10. *KAMPFGRUPPE SUD* HOLDS THEIR POSITION

Throughout the night, the II Battalion, 382<sup>nd</sup> Grenadier Regiment and the II and III battalions, 61<sup>st</sup> Infantry Regiment had stoutly defended their positions against the heavy but uncoordinated attacks of the 8<sup>th</sup> Army. Nevertheless, in the process, the defenders had suffered more casualties. The 10<sup>th</sup> Company of Captain Caimi's III Battalion, 61<sup>st</sup> Infantry Regiment was overpowered (the Royal Warwickshire Yeomanry reported the capture of 250 Italians (probably from the II and III battalions of the 61<sup>st</sup> Infantry Regiment) in this area). Also, the 100/17 howitzers of the 1<sup>st</sup> Battery, II Battalion, 46<sup>th</sup> Artillery Regiment of the 102<sup>nd</sup> *Trento* Division were suppressed.<sup>344</sup> The II Battalion, 382<sup>nd</sup> Grenadier Regiment had again suffered significant losses, with the capture of one officer and 15 enlisted men from their reserve 9<sup>th</sup> Company, alone. Among the losses of II Battalion, 382<sup>nd</sup> Grenadier Regiment, it was reported that their badly wounded commander, *Hauptmann* Alfred Krupfganz had been captured.

Describing the events of this morning near his sector, Second Lieutenant Torelli of 12<sup>th</sup> Company, III Battalion, 61<sup>st</sup> Infantry Regiment wrote in his diary that, *"Towards morning the fighting began again, shortly after sun-up we witnessed a terrible hand-to-hand struggle over on our left. The German 5<sup>th</sup>/382<sup>nd</sup> was completely annihilated. Their C.O., a lieutenant, was one of the last to fall; we could pick him out easily enough because of his great height. At first he had a rifle, but later used his pistol. The enemy got to within 200 yards of our position, but our mortar-fire was too much for them and they beat a retreat.*

*At 09.00 a solitary Stuka circled overhead, then dived down on us and let go its bombs. I was more curious than afraid; we had read so many terrifying descriptions of Stuka dive-bombers in action. We heard the siren*

<sup>i</sup> The official history of the Cavalry Regiment claimed that, *"The anti-tank fire which caused most of the damage seemed to be from some kind of shell which did not penetrate but burst on the outside, showering its target with burning oil. It was rather effective as a tank-killer though it did not cause the usual proportion of personnel casualties since most of the men managed to leap out of their burning vehicles and go back to the gap in the minefield to wait until the rest of the vehicles retired before first light."* However, no munitions fitting this description have been identified in the Axis inventories for this period. *Divisional Cavalry*, R. J. M. Loughnan, Official History of New Zealand in the Second World War 1939-1945, War History Branch, Department of Internal Affairs, Wellington, New Zealand, 1963, page 234.

<sup>ii</sup> In the time until 1 November, this battalion would emplace a total of between 4,751 and 5,701 antitank mines while the Italians engineers in the XXI Corps did not lay any mines during the battle. However, between 26-29 October, the engineers of the Italian XX Motorized Corps did lay 2,000 mines in Mine Box B, while the engineers of X Corps, in the south, laid 1,406 antitank mines and 4,509 antipersonnel mines. US National Archives, Captured German Records Division, Series T-313, Roll 432, Frames 8724865 to 8724867, and Series T-315, Roll 666. One British historian, James Lucas, claims that the Germans had pre-dug holes for their mines in the hard desert floor in order to speed up the laying process. See *War in the Desert, The Eighth Army at El Alamein*, page 194.



scream, then the plane zoomed up again, and a few moments later the bombs went off. It was much the same sort of thing as usual, with nothing particularly terrible about it. A short while after these incident, enemy tanks infiltrated behind our positions and captured the remains of the 10<sup>th</sup> (Company), the assault platoon and the battalion H.Q. So our battalion was now reduced to the 12<sup>th</sup> (Company) and the remnants of the 9<sup>th</sup>. A tank came towards us with a man head and shoulders out of the turret brandishing a machine-gun. Then it about-turned and made off. The boys turned the 47/32 completely around, 180°, but allowed the tank to get away. This was returning cowardice for cowardice if you like; but there were a hundred or more tanks round-about. Three of the men, whose dug-out was in a pretty shaky condition, asked if they could come in with me; so there were four of us. I shared my cigarettes—Serraglio and Macednia extras—and we began talking about the situation. The enormous superiority of the enemy tanks was getting them down a bit.” The Battalion Commander, Captain Caimi, collected the scattered remnants of his headquarters company and counterattacked, reoccupying his battalion headquarters.<sup>345</sup>

By dawn, *Kampfgruppe Sud* had deployed the Wurttembergers of the 1<sup>st</sup> and 4<sup>th</sup> companies, I Battalion, 8<sup>th</sup> Panzer Regiment reinforced with artillery (I Battalion, 33<sup>rd</sup> Panzer Artillery Regiment) against the 10<sup>th</sup> Armoured Division’s penetration in the sector of the III Battalion, 433<sup>rd</sup> Grenadier Regiment. As dawn broke, the elements of *Kampfgruppe Sud* deployed along El Wishka Ridge faced an estimated 60 British tanks. The carefully concealed antitank guns, in particular, proved to be highly effective. Good camouflage and smokeless powder combined with a lack of infantry escorts for the Allied tanks, made it extremely difficult for the British tankers to locate and neutralize them. Therefore, the British began to suffer significant losses. By 0700 on 25 October, the 2<sup>nd</sup> and 3<sup>rd</sup> companies, I Battalion, 8<sup>th</sup> Panzer Regiment had joined the rest of their battalion (Map 18). By 0745, *Kampfgruppe Sud* reported that their attack had been brought to a halt along the line from A. P. 488 to A. P. 404.<sup>346</sup>

## 6.8. SITUATION, MORNING, SUNDAY, 25 OCTOBER

### 6.8.1. XXX CORPS SECTOR, MORNING, 25 OCTOBER

Sunday, 25 October was another warm and sunny day, with occasional light sandstorms. Shortly after dawn, it became apparent to the Allied commanders that the effort to breakthrough the Axis gun line had failed again. The antitank guns, minefields and armor of the *panzerarmee* still prevented a breakout. In the northern corridor, the 1<sup>st</sup> Armoured Division was finally through the minefields in the 9<sup>th</sup> Australian and 51<sup>st</sup> Highland divisions’ sectors, however, they had also been held up by the Axis antitank screen and had made little additional progress.<sup>347</sup> The strong resistance to the advance of the British armor through the southern corridor the previous night seemed to indicate that it was now too costly to resume the attack there. Indeed, General Montgomery’s armored commanders had no desire to persist with their present fruitless operations. Therefore, General Montgomery decided to switch the main effort to the northern corridor. The 10<sup>th</sup> Armoured Division was to be withdrawn from the New Zealand sector and sent north. While preparations for this next attack were made, the New Zealanders would mark time. During this repositioning of forces, there was a danger that the momentum of the attack would slow enough to allow the *panzerarmee* to consolidate in positions farther west. General Montgomery planned to lead the next attack, dubbed Operation Supercharge, with the last of his fresh infantry brigades, capture a bridgehead south of where the Australians had created—for the Axis—an uncomfortable salient which threatened to pin them against the Mediterranean coast.<sup>348</sup>

### 6.8.2. 2<sup>nd</sup> NEW ZEALAND DIVISION SECTOR, MORNING, 25 OCTOBER

By dawn of 25 October, there were seven tank regiments out in front of the 2<sup>nd</sup> New Zealand Division. Although the 8<sup>th</sup> Armoured Brigade still had about 96 of the 133 tanks with which it had started the battle, thanks to its repair crews, its armored regiments had suffered heavily. For example, the Sherwood Rangers Regiment had lost twelve killed (four officers and eight men), fifteen missing, and fifty-eight wounded (eighteen officers and forty men) along with 16 tanks (eight Crusaders and eight Grants). The Staffordshire Yeomanry Regiment had been reduced to two Crusaders and fourteen medium tanks, losing 27 tanks.<sup>349</sup> As stated earlier, the 9<sup>th</sup> Armoured Brigade only had 36 operational tanks left by dawn on 25 October, but only eleven tanks were total losses. Despite these sacrifices, the armor had not been able to breakthrough the Axis gun line on El Wishka Ridge.<sup>350</sup>

As a result of events, General Montgomery decided to have the 2<sup>nd</sup> New Zealand Division reorganize its position for the defense. Since their defensive front was a narrow one, a rarity in the experience of this division, it presented no great difficulties. Each of the two brigades, 5<sup>th</sup> and 6<sup>th</sup>, would have two battalions forward, with the

same boundaries as at present. Although the 9<sup>th</sup> Armoured Brigade was to remain forward of Miteiriya Ridge during the day on 25 October, it was planned to withdraw it that evening to Miteiriya Ridge and take up hull-down positions in support of the New Zealand infantry.<sup>351</sup> For the time being, the tanks of Brigadier Currie's 9<sup>th</sup> Armoured Brigade, were to be deployed in hull-down positions along the ridge, with the Royal Warwickshire Yeomanry Regiment continuing to support the 6<sup>th</sup> Brigade. Strong dismounted patrols, including sappers, were to be sent out to destroy any disabled Axis tanks and vehicles as well as prevent the destruction of damaged British ones, many of which were believed to be recoverable. In addition, Brigadier Currie's tanks were to start probing the Axis positions in an attempt to discover their strengths and dispositions.<sup>352</sup> The battle of attrition would continue violently, in the 'dog-fight' phase that General Montgomery had predicted would last 12 days. However, the operation was not unfolding as General Montgomery had foreseen. Because the armor had failed to reach its objectives that would have enabled the Allied infantry to wear down the Axis infantry, unmolested by armored counterattacks, the 'crumbling' operations could not be executed as General Montgomery had foreseen.

## 6.9. TRANSITION TO THE DEFENSE, 25 OCTOBER

### 6.9.1. 2<sup>nd</sup> NEW ZEALAND DIVISION SECTOR

Throughout the battle, the 2<sup>nd</sup> New Zealand Division had continued to control its sector (Photo 82). Brigadier Kippenberger described the situation, "*General Freyberg, with his tactical headquarters in four Stuart tanks, spent most of every day well forward with his finger on the pulse of the swaying battle. It was often not very amusing making the trip up to him. On one track there was a dead Italian who had been rolled over so often that he was flattened out exactly like a hearthrug. After a visit, I often reflected that the General's idea of safety was purely relative.*"<sup>353</sup>

Despite a lot of Allied movement, the Axis guns were largely silent at this time. The almost constant stream of Allied planes overhead and their ammunition shortage probably accounted for this. As Brigadier Kippenberger described the situation, "*There was no doubt at this time that we were rapidly gaining complete air superiority. The close formations of Bostons and Baltimores, 'the eighteen imperturbables', were going forward and back all day and every day. Enemy fighter-bombers made occasional hit-and-run attacks, but the Stukas were being shot down like pigeons and we saw no more of them after this night.*"<sup>354</sup>

General Freyberg described the events; "*At 1600 hours on the 25<sup>th</sup> I held a conference at Divisional Headquarters. The intelligence Officer first gave his impressions of the prisoners of war. He stated that the Italians of Trento Division were of good type and compared favorably with the German prisoners. It was certain that the enemy had been taken by surprise. Many had been greatly shaken by the bombardment, but casualties as a result of it were not high. A Pole, a Yugoslav, and an Austrian who were interrogated were clearly anti-Nazi. We had captured 260 prisoners on our front. Only 1,400 were taken on the whole Corps front, which showed how thinly held the forward defences had been.*

*I called Brigadiers together to explain the change in policy. Exploitation to the South was no longer possible, and our main objective now was to break through on to the enemy's vital line of communications. 10<sup>th</sup> Armoured Division were to be withdrawn from the New Zealand sector, as 10<sup>th</sup> Corps were to try further North, where a thrust was to be made along the coastal sector by the Australian Division. This new policy was decided at a conference at our Headquarters in the morning. I had urged that the attack should be continued Westwards from the bulge with another timed bombardment to a depth of 4,000 yards. We all knew that the first attack had just failed to push the enemy off his gun line, and this further attack would, I considered, take us beyond his minefields and gun line into an area where the tanks would have room to manoeuvre. Further, the enemy would have to bring Germans of 90<sup>th</sup> Light Division in to hold the line, and I considered that another bombardment and bayonet attack would break them. Although this would mean further casualties to all our Divisions, it seemed to offer prospects of a decisive break through on a wide front.*

*Pending developments, our orders were to economise in holding the line to make troops available for the next attack. We were ordered to re-organise our front for defence. This was not a difficult matter—as Commander 6<sup>th</sup> Brigade said, "It is the first time in our history that we have been given a short front to defend." In fact, we decided to send relays of men back to the beach for a swim.*"<sup>355</sup>

### 6.9.1.1. 6<sup>th</sup> NEW ZEALAND BRIGADE SECTOR

**6.9.1.1.1. 26<sup>th</sup> INFANTRY BATTALION SECTOR.**<sup>356</sup> Shortly before dawn, the companies of the 26<sup>th</sup> Infantry Battalion that had withdrawn in confusion during the Allied artillery barrage the previous night, set out towards their forward positions. Some Allied tanks were still moving about, but apart from this, the sector was quiet. Unfortunately, in the darkness A and C Companies swung too far to the right, with C Company digging in forward of the 22<sup>nd</sup> Infantry Battalion in the adjacent 5<sup>th</sup> Brigade sector. This was not discovered until after daylight, when it was too late to do anything about it. Company C's radio set had broken down, but later a message from the company was relayed, through the 22<sup>nd</sup> Infantry Battalion, to inform 26<sup>th</sup> Infantry Battalion Headquarters of what had happened. The troops had dug in along a line of shallow wadis with tanks all around them. The tanks began engaging targets on El Wishka Ridge, as soon as it was light, and before long were themselves the target for a considerable amount of hostile fire. Huddled in their shallow holes, the men fought off the flies and watched tank after tank being knocked out. Great clouds of smoke and dust, at times, hid everything from sight. Despite the heavy fire, which lasted until midday, few of the infantrymen were hit. Some had miraculous escapes. After each salvo, heads would pop up cautiously out of the holes and there would be a chorus of yells to find out if anyone had been hit.

After midday, the remaining tanks moved south, taking most of the Axis fire with them. By 1400, the sector was fairly quiet and the two companies moved across to their old positions. Later in the day, No. 15 Platoon was finally able to rejoin C Company. Meanwhile, around the 26<sup>th</sup> Infantry Battalion Headquarters, some reorganization had been taking place. Part of the armored force (the 10<sup>th</sup> Armoured Division) prepared to withdraw to the rear, leaving the few surviving tanks of the 9<sup>th</sup> Armoured Brigade stationed along the reverse slope of the ridge. In the 6<sup>th</sup> Brigade's sector lay the wreckage of many vehicles, while on the crest of the ridge and down the forward slope were dozens of tanks. Many had struck mines and others had been knocked out by Axis fire. Fortunately, the Axis gunners were paying little attention to these stationary targets and the shelling of the area did not become heavy until nearly dusk. About 1630, large-caliber guns opened fire again on Miteiriya Ridge from long range. They caused few casualties, and by the end of the day, only nine more men had been wounded.

If it was a slow day for the riflemen, it proved to be a more successful one for the machine gunners and mortarmen dug in along the crest of the ridge. Several of the troublesome Axis machine gun and sniper posts of the II and III battalions of the Italian 61<sup>st</sup> Infantry Regiment and the remnants of the II Battalion, 382<sup>nd</sup> Grenadier Regiment had finally been suppressed or completely silenced. Captain Rutherford, the battalion medical officer, returning from one of his periodic visits down the forward slope, brought back some Axis maps that B Company had captured, together with an officer and a noncommissioned officer. Even to a novice the maps appeared to be complete in every detail, and they were rushed to Corps headquarters for examination.<sup>1</sup> On another trip forward, the doctor returned with a combination periscope and range finder which was presented to the 6<sup>th</sup> Field Regiment.

**6.9.1.1.2. 25<sup>th</sup> INFANTRY BATTALION SECTOR.** During daylight on 25 October, the Axis shelled this area with guns up to 210-millimetre (approximately 8-inch, from the II Battalion, 115<sup>th</sup> Artillery Regiment of *Generalmajor* Weber's 104<sup>th</sup> ARKO) and bombed the guns, tanks, and transport behind the ridge. This caused several casualties in the 25<sup>th</sup> Infantry Battalion, as well as damage to a jeep, a 3-ton truck, and a 2-pounder antitank gun. Throughout the day, Axis tanks had been reported at various places, and in the early afternoon 100 tanks, reported by 10<sup>th</sup> Armoured Division to be advancing towards the 25<sup>th</sup> Infantry Battalion, were shelled by the artillery.<sup>357</sup>

**6.9.1.1.3. 24<sup>th</sup> INFANTRY BATTALION SECTOR.** For the 24<sup>th</sup> Infantry Battalion, the days succeeding the initial attack had been comparatively uneventful. The reverse slope of Miteiriya Ridge was crowded with the tanks and vehicles of the 10<sup>th</sup> Armoured Division and the 9<sup>th</sup> Armoured Brigade. Although the Axis shellfire was heavy at times, the battalion sustained no more than a dozen casualties, none of which were fatal. Major Ramsay stated that, *"One night from this position we saw a lucky strike of a stick of bombs on a long string of vehicles (apparently from the 8<sup>th</sup> Armoured Brigade on the night of 24 October) lined up nose to tail and ready with tank support to make a raid into the enemy held territory on our left. These vehicles were a few hundred yards in front of us, and a great many "bomb happy" soldiers made their way back from them, through us, to spread break-through rumors in the rear."*<sup>358</sup>

<sup>1</sup> Question 13: Are copies the Axis maps captured by Captain Rutherford available?



**6.9.1.2. 2<sup>nd</sup> NEW ZEALAND DIVISION ARTILLERY.** During the day on 25 October, all three New Zealand field regiments gave effective support to the armor operating beyond the infantry's forward defensive positions. The 4<sup>th</sup> Field Regiment caused several groups of transport to disperse and reported scoring a direct hit on a 75-millimeter gun. The return fire, though it caused no loss of men or equipment to the New Zealand gunners, was formidable. It fell heavily in the area of the Regimental Headquarters as well as the 25<sup>th</sup> Battery of the 4<sup>th</sup> Field Regiment and included rounds of up to at least 210 millimeters. The heaviest shell bursts detonated with tremendous violence on the rocky ground. The dust raised by the bombing and shelling was carried by a strong wind that blew up and greatly reduced visibility in the afternoon. The whole of the 6<sup>th</sup> Field Regiment had intended to move forward at this time, but the artillery and supply vehicles of the redeploying 10<sup>th</sup> Armoured Division caused such congestion that only the 48<sup>th</sup> Battery had been able to move forward, and that only about five kilometers. At dusk, a large force of Junkers aircraft (probably Ju-87s) bombed an area to the southwest and several guns of the 14<sup>th</sup> Light Anti-Aircraft Regiment were able to engage at long range, but they did not claim any hits.<sup>359</sup>

In mid-afternoon the 9<sup>th</sup> Armoured Brigade reported to the New Zealand Division Artillery that they were under attack by Axis tanks and were being blinded by smoke put down by the 25-pounders. They requested that this fire be stopped. It turned out, however, that the artillery responsible was that of 10<sup>th</sup> Armoured Division and the request was therefore passed on to them. By the end of the day, the 4<sup>th</sup> Field Regiment had fired 1,843 rounds of high explosives and 37 rounds of smoke.<sup>360</sup>

**6.9.1.3. 2<sup>nd</sup> NEW ZEALAND DIVISION ENGINEERS.** For the sappers, 25 October was another day of clearing support areas of mines. Sergeant Smith's divisional cavalry detachment from the 5<sup>th</sup> Field Park Company worked by night clearing the way for tank transporters to remove some twenty-odd disabled tanks. Two sappers and Sergeant Smith were wounded but the sergeant, after receiving treatment, was able to carry on. Lieutenant-Colonel Hanson, the Chief of Royal Engineers, also used the day to reorganize the sapper command. Major Anderson assumed command of the 6<sup>th</sup> Field Company. He was joined by Lieutenant Goodsir (promoted to captain, from the 7<sup>th</sup> Field Company) as second-in-command, and by Lieutenant Hermans from the divisional headquarters. Captain Rix-Trott (promoted to temporary major), who had been attached to the 5<sup>th</sup> Field Park Company, took command of the field park company, but lost Lieutenant H. M. Scott (promoted captain) to the 7<sup>th</sup> Field Company, and Lieutenant Pickmere to the 8<sup>th</sup> Field Company. Lieutenant Andrew, having won a Military Cross for his courage, finally had to be evacuated with jaundice and the sadly depleted No. 2 Section, 8<sup>th</sup> Field Company, was temporarily divided between the other two sections. The New Zealand sappers had found that hanging around the edge of a battlefield was something of an ordeal. They would rather have been in the fight or, better yet, completely out of it. They were surrounded by artillery, which fired day and night, making sleep impossible. This firing also invited retaliation from both the *Luftwaffe* and Axis artillery. Luckily, both appeared to be too busy in other areas to bother with them. It was also a period of occasional dust storms obliterating the area, of captured Italians marching through the lines, and the ubiquitous, voracious flies.<sup>361</sup>

## **6.9.2. BRITISH 10<sup>th</sup> ARMoured DIVISION ENGINEERS**

Through out the morning of 25 October, Lieutenant-Colonel McMeekan still had not been able to find a trace of his missing Scorpions. *"About midday on the 25<sup>th</sup> the search for the 'Scorpions' was still unsuccessful, so I arranged for a broadcast appeal over the wireless—'Anyone finding three 'Scorpions' to report location immediately to 10 Armoured Division. Last seen Alamein Station.' Another eight hours passed before we heard that all three 'Scorpions' had in the end been evacuated for major repairs; some messages had gone astray; it was never necessary to write out the charge sheet which at one time I was mentally preferring against the officer in charge of them."*<sup>362</sup>

## **6.9.3. KAMPFGRUPPE SUD ATTEMPTS TO RESTORE THE MAIN LINE OF RESISTANCE**<sup>363</sup>

As the day of 25 October progressed, the critical damage caused by the 10<sup>th</sup> Armoured Division's night attack became evident. At 1310, *Generalmajor* Lungerhausen's 164<sup>th</sup> *Leicht Afrika* Division reported that the remnants of the II Battalion, 382<sup>nd</sup> Grenadier Regiment had been overrun again during the night by 80 tanks and pushed out of their positions. The tanks had then penetrated as deep as Point 29. The battalion commander, *Hauptmann* Krupfganz, had been wounded and captured, while among the missing was their ordnance officer, *Leutnant der Reserve* Friedrich Luthke. Indeed, during the day, the Rheinlanders' last remaining antitank gun (of the

nine with which they had begun the battle) had been overrun. Indeed, by this point in the battle, three of the battalion's four companies had been destroyed. Even the surviving 9<sup>th</sup> Company had suffered significant losses.<sup>364</sup> To regain the main line of resistance, the *Oberst* Bayerlein, the acting commander of the *Deutsches Afrika Korps*, ordered that a counterattack be mounted toward A. P. 488. In response to this order, *Oberst* Willi Teege ordered an attack with all available panzers. This attack would be exposed to flanking fire from the British tanks, from 8<sup>th</sup> Battalion, Royal Tank Regiment, in Mine Box K.

Not until 1555 did the German liaison officer with the Italian XXI Corps report that the Sicilians of the II and III battalions, 61<sup>st</sup> Infantry Regiment had been overrun by a tank attack from the east out of Mine Box K. By then, there were no armored reserves left to help them. Then, the badly shaken and lightly armed remnants of the II Battalion, 61<sup>st</sup> Infantry Regiment were ordered to counterattack and regain the positions lost when 5<sup>th</sup> Company, II Battalion, 382<sup>nd</sup> Grenadier Regiment had been destroyed. Of this order, Second Lieutenant Torelli of the 12<sup>th</sup> Company, III Battalion, 61<sup>st</sup> Infantry Regiment, wrote, *"Our High Command is certainly ambitious! As I knew the positions pretty thoroughly, I took over the operation and set off with one company across an area littered with dead Germans and South Africans. It can easily be imagined what effect this spectacle had on the morale of our newcomers."*<sup>365</sup> The counterattack was unsuccessful. Meanwhile, on the right of the remnants of Captain Caimi's battalion, the Sicilians of I Battalion, 61<sup>st</sup> Infantry Regiment had thrown back an attack by the South Africans. At 1610, the *Deutsches Afrika Korps* reported that although two companies of the valiant III Battalion, 61<sup>st</sup> Infantry Regiment had been destroyed, one company (Second Lieutenant Torelli's 12<sup>th</sup> Company) continued to resist, even though the Sicilians were now without any antitank guns. They had begun the battle with six 47/32 antitank guns (they still had some of their seven nearly useless Solothurn 20mm antitank rifles).

Soon after receiving their orders, *Oberst* Teege's panzers, from I Battalion, 8<sup>th</sup> Panzer Regiment had crossed the Alarm Track with 20 German panzers, their mission was to seize A. P. 488. They were supported by 40 Italian tanks (presumably M14s from the XII Battalion, 133<sup>rd</sup> Tank Regiment), who were tasked with retaking the southwest corner of Mine Box L. At 1635, I Battalion, 8<sup>th</sup> Panzer Regiment reported, *"Our attack against A.P. 488 is advancing well. The Italians are ¾ of an hour late assembling."* By 1655, the German panzers had advanced 2000 meters beyond the Alarm Track, with the Italians, on their left flank, correspondingly back. An hour later, the 8<sup>th</sup> Panzer Regiment reported that, *"the attack toward A.P. 488 is now advancing slowly. The Italians have come forward. We are taking flanking fire from the area opposite Kampfgruppe Mitte."* At 1810, *Oberst* Teege requested infantry reinforcements to secure his tanks and consolidate his gains.

At 1850, two companies of *Bersaglieri*, from XXXVI Battalion, 12<sup>th</sup> *Bersaglieri* Regiment (Appendix I and Table 24), were attached to *Kampfgruppe* "Teege." Each of these companies was authorized five officers, thirteen non-commissioned Officers, and 111 enlisted in four platoons (one antitank platoon, one 20mm Antitank Platoon, one machine gun platoon, and one rifle platoon). Each of these companies was equipped with about two 47/32 antitank guns, two 20mm antitank rifles, 2 heavy machine guns and two light machine guns. With the release of these two companies to *Kampfgruppe Sud*, the *panzerarmee* had committed the last of their reserves in the northern sector. At 2320, *Kampfgruppe Sud* reported that, *"The remaining operational tanks have been stopped by heavy artillery fire. The Italians are requesting reinforcements."*

#### 6.9.4. 15<sup>th</sup> PANZER DIVISION ASSESSES THE SITUATION<sup>366</sup>

By this point in the battle, the Italian 102<sup>nd</sup> *Trento* Division reported that their infantry had been reduced by 60% and that most of their artillery had also been lost. The 164<sup>th</sup> *Leicht Afrika* Division reported that they had lost two infantry battalions, plus the bulk of two artillery batteries.

*Generalmajor* von Vaerst's 15<sup>th</sup> Panzer Division also recognized the costly nature of their local successes, in their summary of the day's fighting, *"The enemy, in spite of heavy artillery, bombing and tank employment during the day, has not gained additional ground. He is gradually advancing. He has succeeded in smashing III Battalion, 382<sup>nd</sup> Grenadier Regiment and III Battalion, 61<sup>st</sup> Infantry Regiment. There has been a critical attrition of our panzer force through the constant counterattacks. The English allow the German panzers to deliberately attack. In this situation, their new tanks can fire effectively to a range of 2000 to 2300 meters, but the weapons of the German panzers can not reply effectively at this range."*

*Also today, the enemy used a lot of smoke. It was skillfully employed to enable their infantry to make surprise attacks and for the deployment of their armor. Our own weakened infantry are dangerously threatened by*

enemy infantry attacks supported by heavy artillery fire. The available (antitank) minefields offer no protection against these dismounted attacks.

A threatening situation has developed in the north by Point 28. The boundary between I and II battalions, 115<sup>th</sup> Panzer Grenadier Regiment is unsecured, and the situation in the seam is unclear. Most likely, the enemy already has dug-in infantry in the area. We lack effective countermeasures.

Again, today, the enemy has paid for their attacks with heavy losses. 119 tanks were knocked out through the sacrifices of the combat troops of the division." Of the 119 tanks reported destroyed by the 15<sup>th</sup> Panzer Division, *Kampfgruppe Mitte* claimed 52, *Kampfgruppe Sud* claimed 18, and the 164<sup>th</sup> *Leicht Afrika* Division claimed the remaining 49. The 15<sup>th</sup> Panzer Division also reported the capture of 35 prisoners in their southern sector.<sup>367</sup>

By the end of the day on 25 October, the 15<sup>th</sup> Panzer Division reported that they had only 25 medium tanks combat ready (9 Panzer IIIs, 9 Panzer III Specials, 2 Panzer IVs, and 5 Panzer IV Specials). In addition, they had 11 Panzer II light tanks and 1 command tank (*gross Befehlswagen*, a Panzer III modified for employment as a command vehicle by removing the main gun and using that space for additional radios). For the day, the 15<sup>th</sup> Panzer Division reported 6 men killed (1 officer and 5 enlisted), 17 wounded (2 officers, 2 non-commissioned officers, and 13 enlisted), plus about 25 tanks which were total losses. Other equipment losses included eight 7.62cm self-propelled antitank guns, three 5cm antitank guns, one light howitzer (presumably a 10.5cm le FH 18), one 2cm flak gun, and four trucks. Their supply situation continued to deteriorate. The division was now down to only one day's supply of fuel for the thirsty panzers, 1.5 days for the wheeled vehicles, and 1-3 days of food and water for the men.<sup>368</sup>

In general, the Axis artillery had also suffered severely in this sector. Many of their guns had been damaged or destroyed, communications had been disrupted (making it impossible to mass fires), and the ammunition shortage was now acutely felt (particularly the lack of 5cm armor piercing rounds). Consequently, the Axis artillery could no longer effectively disrupt the Allied columns that were still bunched up in their long, narrow breach lanes through the Axis minefields.<sup>369</sup>

## 6.10. STALEMATE ALONG MITEIRIYA RIDGE, DUSK, 25 OCTOBER TO MONDAY, 26 OCTOBER

### 6.10.1. GENERALFELDMARSHALL ROMMEL RETURNS TO THE DEUTCH-ITALIENISCHEN PANZERARMEE

During a short stop in Rome, General Rintelen, the German Military Attaché to Italy, briefed *Generalfeldmarshall* Rommel on the situation. He had informed the *Generalfeldmarshall* that only three issues of fuel (equivalent to 300 kilometers per vehicle) remained available in North Africa. When *Generalfeldmarshall* Rommel had left for Europe, there were eight. His experience had shown that one issue was required for each day of battle. This fuel shortage had effectively crippled the *panzerarmee*. Next, *Generalfeldmarshall* Rommel flew on to Egypt, reaching his headquarters by 1930 where he reassumed command of his beloved *panzerarmee*.<sup>1</sup> The *Generalfeldmarshall* described his return to his old headquarters, "General von Thoma and Colonel Westphal reported to me that evening on the course of the battle to date, mentioning particularly that General Stumme had forbidden the bombardment of the enemy assembly positions on the first night of the attack, on account of the ammunition shortage. As a result, the enemy had been able to take possession of part of our minefield and to overcome the occupying troops with comparatively small losses to himself. The petrol situation made any major movement impossible and permitted only local counter-attacks by the armour deployed behind the particular sector which was in danger. Units of the 15<sup>th</sup> Panzer Division had counter-attacked several times on the 24<sup>th</sup> and 25<sup>th</sup> October, but had suffered frightful losses in the terrible British Artillery fire and non-stop R.A.F. bombing attacks. By the evening of the 25<sup>th</sup>, only 31 of their 119 tanks remained serviceable.... The R.A.F.'s new fighter-bombers (reported to be US manufactured P-39 Bell Airacobras, with a 37mm gun firing through the propeller hub, but more probably the Hurricane IIDs) were particularly in evidence, as is shown by the fact that every one of the captured tanks (US built Stuarts) belonging to the *Kampfstaffel* had been shot up by this new type of aircraft.

Our aim for the next few days was to throw the enemy out of our main defence line at all costs and to reoccupy our old positions, in order to avoid having a westward bulge in our front."<sup>370</sup> *Generalfeldmarshall* Rommel was also informed that more than half of the infantry and artillery of the Italian 102<sup>nd</sup> Trento Division had been wiped out. In addition, two infantry battalions (probably the I and II Battalions, 382<sup>nd</sup> Grenadier Regiment) and the two artillery battalions of the 164<sup>th</sup> *Leicht Afrika* Division were now combat ineffective.<sup>371</sup> Although the

<sup>1</sup> For a detailed account of his return journey, see *The Trail of the Fox*, pages 218-219.



*panzerarmee* had effectively won the first round with the 8<sup>th</sup> Army, they were in a precarious situation for round two. *Generalfeldmarshall* Rommel felt that he had to improve his situation before the 8<sup>th</sup> Army had a chance to regroup and launch another deliberate attack. Therefore, he planned seize the initiative by making a series of powerful counterattacks, as he had often done in the past. By this time, however, these attacks would have to be directed against dug in positions. What *Generalfeldmarshall* Rommel did not foresee was that this would result in the further erosion his limited armor strength without a substantial improvement in his situation.

By the evening of 25 October, the 8<sup>th</sup> Army had captured some 1,456 Axis prisoners, of who about 600 were German. Including these prisoners, the *panzerarmee*'s losses were probably not much different from those of the 8<sup>th</sup> Army, which totaled slightly less than 3,000. The 132<sup>nd</sup> *Ariete* Armored and the 21<sup>st</sup> Panzer divisions in the south behind the splendid defense by the Italian paratroopers of the 185<sup>th</sup> *Folgore* Division were still largely untouched.<sup>372</sup>

By 26 October, the *panzerarmee*'s losses had reportedly risen to a total of about 3,700 men (1,700 Germans and 1,955 Italians), with 307 killed (148 Germans and 159 Italians), 919 wounded (495 Germans and 424 Italians) and 2,429 missing (1,057 Germans and 1,372 Italians). Of these, the Allies had reportedly captured 2,162 (1,534 Italians and 628 Germans). By this day (Map 19), the battle of attrition had reduced the strength of the Axis infantry units so low that *Generalfeldmarshall* Rommel was forced to commit *Hauptmann* Hinrich's 33<sup>rd</sup> Panzer Pioneer Battalion as infantry against the 51<sup>st</sup> Highland Division. Indeed, the next day, the Rheinlanders of the III Battalion, 382<sup>nd</sup> Grenadier Regiment, which had defended this sector, reported a combat strength of only 1 officer and 10 men.<sup>373</sup> *Generalfeldmarshall* Rommel's armored units also reported heavy casualties; losing of 125 tanks (67 German and 58 Italian). Of the *panzerarmee*'s five armored or motorized divisions, those in the north had born the brunt of the fighting. So far during the battle, the 15<sup>th</sup> Panzer Division had lost 61 of its precious panzers while its partner, the 133<sup>rd</sup> *Littorio* Armored Division had also suffered heavily, losing 58 of its original 116 tanks. Up to this point, the tanks of the other three armored or motorized divisions had not been heavily engaged. The 21<sup>st</sup> Panzer Division had lost 8 tanks, the 132<sup>nd</sup> *Ariete* Armored Division had lost 2, and the 101<sup>st</sup> *Trieste* Motorized Infantry Division had not lost any from its lone tank battalion. In exchange, the *panzerarmee* reported that they had knocked-out 215 tanks (including 83 in Mine Box L) and 38 armored cars.<sup>374</sup> In addition, the *Luftwaffe* had lost 12 aircraft against 16 lost by the Allies up to this point in the battle.<sup>375</sup>

#### **6.10.2. 6<sup>th</sup> NEW ZEALAND BRIGADE DEFENDS ALONG PHASE LINE OXALIC**

On 25 October, for the second night in a row, the New Zealand infantry formed a defensive line along the crest of Miteiriya Ridge and the troops spent most of the time before daylight trying to dig in properly into the rocky ground. A troop of 6-pounders from the 7<sup>th</sup> Anti-Tank Regiment was sent forward by the 6<sup>th</sup> Brigade Headquarters and took up positions to cover the forward slope. The line was further strengthened when the right-flank company of the 25<sup>th</sup> Infantry Battalion finally extended across to link-up with A Company, 26<sup>th</sup> Infantry Battalion.

**6.10.2.1. 26<sup>th</sup> INFANTRY BATTALION SECTOR.**<sup>376</sup> After dusk, more tanks withdrew into the area around the 26<sup>th</sup> Infantry Battalion headquarters, and those forward of the companies began to move back through the minefield breaches to laager for the night. At 1900, the company commanders had reported, as ordered, to battalion headquarters. Just before they arrived, a disturbing message was received from Company A's radio operator that C Company was being rounded up by Axis tanks. At first, the message was treated as a joke. Captain Horrell, who arrived at battalion headquarters a few minutes later, took the same view. A second message, this time from B Company, confirmed the story. Lieutenant-Colonel Fountaine immediately ordered both companies to withdraw behind the old Axis minefield. As the three company commanders hurriedly returned to their headquarters, the battalion headquarters vainly tried to raise C Company, which only a short while before had been in communications with it by field telephone.

When the three officers reached the minefield, they met A and B Companies, plus a few men from C Company. The men from C Company confirmed the presence of an Axis tank in the company's area, and Captain Horrell decided to go on to his headquarters to make sure. In the meantime, the supporting British tank commander (apparently from the Royal Warwickshire Yeomanry Regiment) had been warned of what had happened and had ordered all troops to remain where they were. The tanks opened fire and Captain Horrell, who was close to C Company Headquarters by this time, had to race for cover. It was a tense situation, for nobody had the least idea of the strength of the Axis party. Lieutenant A. J. Fraser (No. 14 Platoon), who had escaped, arrived at battalion

headquarters and told the commander that there had been only one Axis tank and that it was probably well away by that time. This news was passed on to the British tank commander and movement restrictions were relaxed. Then three tanks were posted to watch the minefield gap. On going back to the 26<sup>th</sup> Infantry Battalion Headquarters, Captain Horrell was ordered to round up a party of his men and return to the forward sector to collect any abandoned gear. The small party met unexpected opposition at the minefield gap, where the British tank commander informed Captain Horrell that he would fire at anything that moved. However, since Lieutenant-Colonel Fountaine had been adamant on the recovery of the equipment, the party continued on to C Company's sector. Soon, everything was collected, even the unopened food canisters. A Bren gunner was found sound asleep in one of the listening posts and was very abusive at being awakened. However, he lost no time in joining the others when he learned what had happened to the rest of his unit. Somewhat apprehensively, the party set out on the return journey, but there was no sign of the tanks at the gap.

The story of how the C Company men were captured could not be pieced together until much later. It seems that, after dusk, listening posts had been established forward of the platoons, and the men were out of their trenches, yawning and stretching their legs after a long day in their cramped positions. Since Allied tanks had been moving back through the sector since dusk, the arrival of one more did not arouse any particular interest. This tank a Grant, moved past one platoon with its commander saying something to the men in English. It then wheeled and came up behind the forward platoons. Still unsuspecting, the men approached to talk with the crew, only to find themselves covered by two Germans, armed with 'Spandau' machine guns. Caught unarmed, the men had no choice but to surrender, and Lieutenant Barton and 32 other ranks were marched off to captivity.<sup>i</sup> A few others did manage to escape by dropping into tank ruts. Immediately after he realized what was happening, Lieutenant Fraser, who was at the company headquarters, rushed over to the nearest British tanks and begged the squadron commander to take some action. The British officer refused because he would have to wait for instructions from his own commander. In the meantime, Second-Lieutenant Boyle, the 15<sup>th</sup> Platoon Commander, had tried, unsuccessfully, to shoot the two Germans on the tank, which then quickly disappeared from sight. Company C was now reduced to a little more than twenty men, some of whom had been badly shaken by the heavy shelling of the past 48 hours. Captain Horrell, who had been wounded during the afternoon, remained with his depleted company.

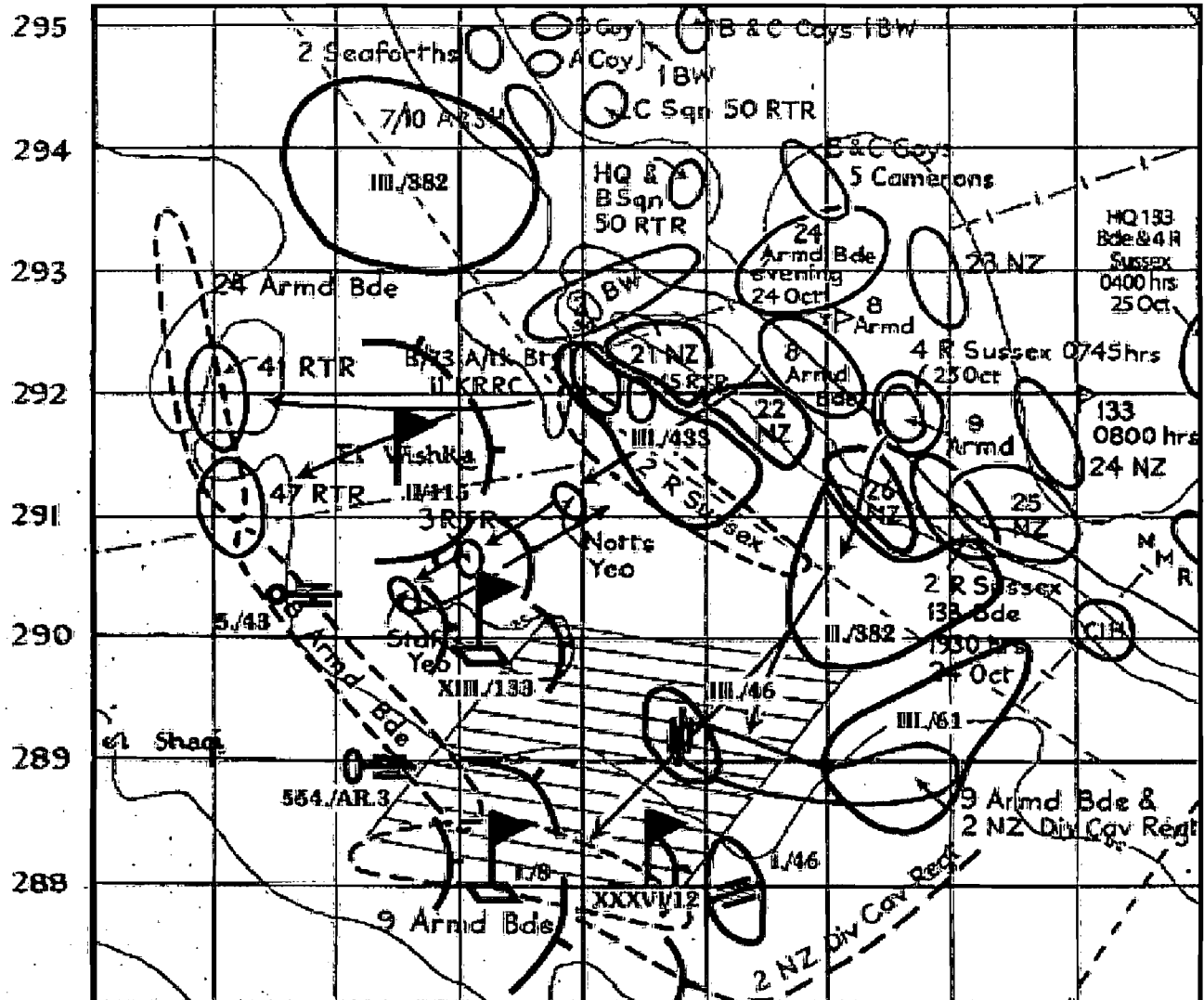
**6.10.2.2. 25<sup>th</sup> INFANTRY BATTALION SECTOR.**<sup>377</sup> On the night of 25 October, dismounted patrols from the forward infantry battalions of the 2<sup>nd</sup> New Zealand Division were pushed out. One of these patrols, from the 25<sup>th</sup> Infantry Battalion, reported seeing Axis tanks and a work party emplacing mines (probably from the 220<sup>th</sup> Pioneer Battalion, which laid 106 antitank mines on this night). The patrol also engaged two mortar positions about 4,500 meters forward of the ridge and they determined that the minefield in front of the left flank of the battalion extended southwards, from the crest of the ridge, for at least 700 meters.

### **6.10.3. II BATTALION, 382<sup>nd</sup> GRENADEER REGIMENT IS REINFORCED**<sup>378</sup>



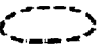


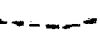


During the night of 25 October, the surviving Rheinlanders of the II Battalion, 382<sup>nd</sup> Grenadier Regiment, now without antitank weapons, still clung to their positions along Miteiriya Ridge. Later that night, two companies from the III Battalion, 433<sup>rd</sup> Grenadier Regiment arrived as reinforcements. Around midnight, pioneers from *Hauptmann Hinrichs'* 33<sup>rd</sup> Panzer Pioneer Battalion crept forward through the Allied artillery fire in an attempt to lay mines in front of III Battalion, 115<sup>th</sup> Panzer Grenadier Regiment (Map 19, notice: the II Battalion, 382<sup>nd</sup> Grenadier Regiment has been removed from this German map).

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<sup>i</sup> Apparently, these constitute the bulk of the 35 men reported captured by the 15<sup>th</sup> Panzer Division in the southern sector at about this time.



#### Legend

Troops of 30 Corps	{ planned 
	{ actual 
Troops of 10 Corps	{ planned 
	{ actual 
Artillery barrage	
Final objective of 30 Corps	
German Troops	
Italian Troops	

Scale 1/50,000 (Approx.)

MAP 19. 15<sup>th</sup> Panzer Division Situation Map, Morning 26 October  
(See Annex 3, Appendix E for an explanation of German military symbology)



## 6.11. THE END OF OPERATION LIGHTFOOT, MONDAY 26 OCTOBER TO FRIDAY, 31 OCTOBER

### 6.11.1. 2<sup>nd</sup> NEW ZEALAND DIVISION ENGINEERS SUPPORT TO THE 6<sup>th</sup> BRIGADE'S ATTACK TO GAIN ALL OF PHASE LINE OXALIC IN THE BRIGADE ZONE<sup>379</sup>

On the night of 26 October, the 6<sup>th</sup> New Zealand Brigade and the South Africans were tasked with straightening the line by taking their original objectives along Phase Line Oxalic. In order to do this, the Sicilians of the II and III battalions of the 61<sup>st</sup> Infantry Regiment had to be ejected from their positions. Major Reid's 8<sup>th</sup> Field Company was ordered to be ready to assist by breaching the minefield east of Miteiriya Ridge and emplacing a new minefield in front of the new position. No. 3 Section, under Lieutenant Pickmere, was assigned to the 26<sup>th</sup> Infantry Battalion on the right of the brigade, while No. 1 Section, under Lieutenant Hanger, was assigned to the 25<sup>th</sup> Infantry Battalion on the left flank. Both section commanders, each with three sappers, were to accompany the infantry and reconnoiter beyond the final objectives to see if any minefields should be emplaced before first light. The barrage was scheduled to begin at 2000. Major Reid would have the two sections waiting with the other units' transport near a breach made by the 5<sup>th</sup> Field Park Company on the top of the ridge. As soon as the success signal went up they would pass through the gap and move to the new positions on the double.

Lieutenant Pickmere found his experiences with the 26<sup>th</sup> Infantry Battalion to be rather interesting; *"We left the shelter of our slit-trenches and were soon strung out in a well-dispersed line along the ridge and advancing at walking pace in three waves—about 50 yards between each. Crossed a trip wire and were in a minefield where I picked my way fairly carefully but the infantry walked on regardless.... Then all of a sudden things began to happen — tracers flying in all directions, explosive bullets cracking around us and ricochets zipping about off the flinty desert. The infantry loosed off a few rounds from their Bren guns but kept on advancing. We crouched down to see what was going to happen and then got cautiously up again, Bill Webb leading the way. He was used to this sort of thing having transferred to us from the infantry and didn't turn a hair. (a coy was forced to ground by flanking machine guns, lost heavily and were eventually withdrawn.) Meanwhile Bill Webb had crawled over to me and we swapped views on the situation—I think for two pins he would have stormed the machine gun nests on his own, but we finally decided it was no business of ours—we were there to do a job after the infantry had done theirs and silencing enemy infantry was definitely not one of our roles."* After narrowly escaping being taken prisoner, Lieutenant Pickmere reported to 26<sup>th</sup> Infantry Battalion Headquarters and was told that there was little chance of being able to make a forward reconnaissance that night. His whole party had escaped casualties and he led them along the ridge where he met Major Reid who was out looking for them.

Lieutenant Hanger had a similar experience with the 25<sup>th</sup> Infantry Battalion. While the section had remained with the rest of the transport below the crest of the ridge, he and Sergeant Derrick Campbell went forward with the infantry, who occupied their objective but were only able just to hang on. *"We had to take cover in some Eytie sangers. Incidentally these were full of yabbering Latin gentlemen whom we took prisoners. After some time, Major Reid came forward and ordered us back as it was getting too near first light."* Meanwhile, Major Reid had found a tank that would come forward and silence the fire covering the minefield gap. With that, the supporting arms filed through. Lieutenant-Colonel Bonifant, Commander of the 25<sup>th</sup> Infantry Battalion, who had returned from the forward area about this time, *"considered it was madness to try and take our mine trucks forward as they were loaded with gelignite mines."* The sappers did not try to change his mind. Lieutenant-Colonel Bonifant's main worry was getting his antitank guns and mortars forward as soon as possible, so they could be dug in before daybreak. The minefield on his line of advance had not yet been breached, so Major Reid and some sappers walked forward and inspected the field with the idea of towing the guns through between the mines. Major Reid described the incident, *"I picked up a few mines which were plainly visible, as we marked the route with a tracing tape. The anti-tank guns were unloaded from the portees and tied behind jeeps; then, with the Colonel and myself leading, the carriers and jeeps followed us through the field quite successfully."* The sappers of the 8<sup>th</sup> Field Company then returned to their lines and the next morning, after handing over engineer responsibility for their area to a South African sapper company, they rejoined the other units of the brigade, some twenty-five kilometers in the rear.

Throughout Operation Lightfoot, Lieutenant-Colonel Hanson's sappers had done a superb job for their division and their casualties reflected the difficulty of their tasks. In fact, their casualty rate (Table 28) was comparable to that of some infantry units. However, unlike their comrades in the New Zealand infantry, who would sit out Operation Supercharge, the sappers would be called upon to lead the way through the German minefields, this time for the infantry of the 51<sup>st</sup> Highland Division.

**TABLE 28. ENGINEER CASUALTIES, 2<sup>nd</sup> NEW ZEALAND DIVISION**

UNIT	23-24 OCT	24-25 OCT	25-26 OCT	1-2 NOV	TOTAL*
6 <sup>th</sup> Field Company (-)		1 KIA (mine) 11 other casualties		1 WIA 2 trucks (mines)	1 KIA (mine) + 3 KIA 2 WIA (artillery) + 17 WIA 3 Flails stuck 2 trucks (mine)
7 <sup>th</sup> Field Company (+)	12 WIA 1 Flail stuck 1 Flail (mine) 1 Flail Breakdown				2 KIA, 22 WIA 1 Flail stuck 1 Flail (mine) 1 Flail Breakdown
8 <sup>th</sup> Field Company (+)	4 KIA (mine)+ 1 KIA (unk) 12 WIA (mine) 1 Jeep (mine) 3 Flails (stuck)			1 Jeep (mine)	4 KIA (mine)+ 6 KIA 12 WIA (mine) + 4 WIA 2 Jeeps (mines) 3 Flails (stuck)
5 <sup>th</sup> Field Park Company			3 WIA		5 WIA
Engineer Total	4 KIA (mine)+1 KIA 12 WIA (mine)+12 WIA 1 Jeep (mine) 1 Flail (mine), 1 breakdown, 4 Flails (stuck)	1 KIA (mine) 11 other casualties	3 WIA	1 WIA 2 trucks (mines) 1 Jeep (mine)	5 KIA (mine) +5 KIA 12 WIA (mine) + 45 WIA 2 Jeeps (mine) 1 Flail (mine), 1 breakdown, 4 Flails (stuck) 2 trucks (mine)

\* The sum of the daily breakdown of casualties does not equal the total. Apparently, not all casualties are included in the narrative of the Official History.

### 6.11.2. ADJACENT UNITS

In the 1<sup>st</sup> South African Division zone, they intended to reach a line up to 900 meters (1,000 yards) beyond Phase Line Oxalic. As part of this attack, a company from the Capetown Highlanders and one from the 2<sup>nd</sup> Regiment Botha were tasked to assault a strongpoint, recently reoccupied by 60 Axis soldiers, at the junction of the South African and New Zealand objectives along Phase Line Oxalic. This position had become known as “The Beehive” and was held by Sicilians from the 61<sup>st</sup> Infantry Regiment. As a result of their efforts, the 1<sup>st</sup> South African Division liberated three British prisoners from the Axis and captured 5 officers (four Italians, one German) and 75 men (three of which were German), while killing an estimated 40 men.<sup>380</sup>

### 6.11.3. MAJOR MOORE, 3<sup>rd</sup> FIELD SQUADRON, ROYAL ENGINEERS, EARNS THE DISTINGUISHED SERVICE ORDER

*“On the night of the 27<sup>th</sup>, although completely exhausted by six days of continuous fighting and mine-clearing, Moore led a party of three Sappers in scout cars into enemy territory in order to destroy a damaged 88mm gun before it could be repaired by an agile German recovery crew.*

*As he stepped out of his vehicle he found himself covered by a German corporal with a machine gun. Leaping at him, Moore seized the gun, and the two fell struggling to the ground. As the other Sappers came to his aid, the Germans started throwing grenades, which injured Moore in the head and arm and wounded all the Sappers. Moore managed to recover his revolver with his uninjured hand and shot the corporal.*

*After a short fight the remaining Germans fled into the darkness. Moore then managed to blow up the 88mm gun and get his wounded men back to safety. In spite of his wounds and exhaustion he continued to direct gun- and tank-busting operations of his squadron for a further six days.*

*The official citation for Moore’s immediate DSO stressed that “the tireless energy, inflexible determination and supreme courage of this officer were an inspiration not only to his own but also to the many officers and men beside whom he fought.”<sup>381</sup>*

### 6.11.4. 15<sup>th</sup> PANZER DIVISION CONTINUES TO DEFEND<sup>382</sup>

For the fighting on 26 October, the 15<sup>th</sup> Panzer Division claimed to have destroyed an additional 36 tanks, four armored cars, two Bren gun carriers, one gun and five trucks, without losing any panzers themselves. Indeed, with hostile pressure down while the 8<sup>th</sup> Army reorganized itself in preparation for Operation Supercharge, the panzer strength of the division had recovered somewhat. By this evening, the division was able to report 39 combat ready medium tanks (16 Panzer IIIs, 16 Panzer III Specials, 1 Panzer IV, and 6 Panzer IV Specials). In addition,

they had eight Panzer II light tanks and one command tank operational.

Local attacks by the 6<sup>th</sup> New Zealand Brigade and the 1<sup>st</sup> South African Division near the southwest edge of Mine Box K during the afternoon of 27 October, had badly damaged the II Battalion, 382<sup>nd</sup> Grenadier Regiment and almost wiped out the remnants of II and III battalions, 61<sup>st</sup> Infantry Regiment. Because of earlier losses, these had been consolidated into a single unit. Reduced to little more than company strength, Captain Caimi's Sicilians continued to desperately resist. Although the survivors were tied into the right flank of the II Battalion, 433<sup>rd</sup> Grenadier Regiment, their left flank was exposed. Until this gap could be closed, the II Battalion, 382<sup>nd</sup> Grenadier Regiment was ordered to push patrols toward their Sicilian comrades.<sup>383</sup> Second Lieutenant Torelli of the 12<sup>th</sup> Company, III Battalion, 61<sup>st</sup> Infantry Regiment described the action, *"By dawn on the third day we were a bit on edge. I saw the enemy standing on the cab of a lorry and looking towards our lines. I grabbed a rifle, sighted and fired. The Captain, who was watching through his binoculars, saw the man jump down. I had missed, but I must have given him a bit of a shock. We fired our mortars for an hour or so. The plain was once again invaded by the tanks. It looked like the beginning of the end. I tore the map and other documents into tiny pieces and buried them in the sand. I examined my conscience. I had no regrets and I was prepared to accept my fate; killed, wounded or captured—it was all the same to me."*

*The bombardment began again in the evening. I put my greatcoat on over my sweater and went on a tour of inspection to see if anything was needed. I ticked off one group that hadn't done as I told them with their ammunition. We came under concentrated fire, and I stopped with two subalterns. After about twenty minutes there was a terrific commotion—rockets going up and voices shouting "Come On!" in English—over in the direction of Battalion H.Q. I ordered the men to open fire, and we let fly at the whole crowd of them, Italians and British indiscriminately. The British thereupon abandoned their prisoners and came after us with their sub-machine guns. We opened up with the machine gun and the anti-tank Solothurn. The machine-gun jammed first, then the Solothurn. The two subalterns and myself charged them, flinging hand-grenades, but it was a useless gesture of defiance; their hand-grenades were a damned sight more lethal than ours. On all sides I could hear the groans of the dying and the wounded. We fired rockets at a group coming at us with fixed bayonets; a few men surrendered, but the first two were shot down. A couple of enemy soldiers set on me. I grappled with them, and we rolled over and over on the ground. They were splitting their sides with laughter; drunk as lords. Then were we taken in the rear by other groups who had already occupied two positions that had been left without officers... I suppose they didn't kill me because I could speak their language. All around there was the usual scene of battle: men writhing in agony, some squealing like stuck pigs over a scratch, others suffering atrocious wounds in silence: some vomiting all over the place, others messing their trousers. We had seen it all before... I noticed that our captors were wearing a variety of uniforms; they seemed to be a mixture of tankmen, New Zealanders, South Africans, and Scotsmen. All ranks had tommy-guns."*<sup>384</sup>

For the fighting on this day, the 15<sup>th</sup> Panzer Division claimed to have destroyed an additional 32 tanks, two armored cars, four Bren gun carriers (on mines), one gun and one antitank gun. As the combat began to gain renewed intensity in the northern part of the sector, the division could only report 23 combat ready medium tanks on the evening of 27 October (ten Panzer IIIs, ten Panzer III Specials, one Panzer IV, and two Panzer IV Specials). In addition, they had seven Panzer II light tanks and one command tank.

By the evening of 28 October, the division reported that they had only 21 combat ready medium tanks (nine Panzer IIIs, eight Panzer III Specials, one Panzer IV, and three Panzer IV Specials). In addition, they had three Panzer II light tanks and one command tank. The rest of this proud division had also suffered heavily. The I Battalion, 115<sup>th</sup> Panzer Grenadier Regiment had been reduced to 50% strength while III Battalion, 115<sup>th</sup> Panzer Grenadier Regiment was down to a company of about 70 men, however, II Battalion, 115<sup>th</sup> Panzer Grenadier Regiment was still in fairly good condition. The 33<sup>rd</sup> *Panzerjaeger* Battalion had also suffered heavy losses, being reduced to one company of 5cm PAK guns and a single 7.62cm self-propelled gun. On this day, it was also necessary to commit *Hauptmann Streitz*' 220<sup>th</sup> Pioneer Battalion as infantry. They deployed two companies on the left flank of the II Battalion, 115<sup>th</sup> Panzer Grenadier Regiment to partially fill a void between the II and III battalions, 115<sup>th</sup> Panzer Grenadier Regiment.

The 15<sup>th</sup> Panzer Division's intrepid Italian comrades in the 133<sup>rd</sup> *Littorio* Armored Division had also suffered severely, with only 20 tanks left operational in their 133<sup>rd</sup> Tank Regiment. The XXXVI Battalion, 12<sup>th</sup> *Bersaglieri* Regiment had been reduced to about 50% strength. In their *schlachtbericht* (Battle Report), the 15<sup>th</sup> Panzer Division praised their much maligned Italian comrades. *"The combat value of the Italian motorized*



divisions, especially the Littorio and the Ariete, which the 15. P. D. frequently cooperated with, was high. The Italian troop commanders of these divisions supported the wishes of the German Kampfgruppe commanders. The Littorio Division gave their approval in all cases, on short notice, when the actions were prepared by local leaders.

The command of the Littorio, given the requirements of the situation, faithfully and unconditionally adjusted to the needs of the German leaders. Their units, in close comradeship with the Germans, stood through the difficult battle at the side of units from the 15. P. D. and sacrificed themselves. So much more must be acknowledged, as their armor and main guns (the most powerful is 4.7 cm!) and speed in combat still remains behind that of the German equipment.”<sup>385</sup>

By dusk on 30 October, the *Deutsches Afrika Korps* found that they had only 62 tanks (39 German and 23 Italian), plus eight *Semovente* assault guns left in the northern sector.<sup>386</sup> During the less intense combat, on 31 October, while the 8<sup>th</sup> Army was redeploying for Operation Supercharge, the *panzerarmee* was able to assess the situation. They estimated the damage that they had inflicted on the Allies (see Table 29). The units in the northern part of the front (15<sup>th</sup> Panzer, 164<sup>th</sup> *Leicht Afrika*, 133<sup>rd</sup> *Littorio*, and 102<sup>nd</sup> *Trento* divisions) had inflicted most of these losses. The desperateness of their situation was even reflected in their mine supply situation. In the last five days, they had issued 31,665 antitank mines (of which 2,450 were Italian B2 antitank mines and 16,350 Italian V3 dual-purpose mines, see Table 30), 2,000 antipersonnel mines and 7,800 kg of demolitions. This had depleted the *panzerarmee*'s stocks to 40,000 of the unpopular and dangerous V3s. Of this day, Colonel Sillavengo noted that, “The famous 3<sup>rd</sup>/61<sup>st</sup> Infantry was also swallowed up. Captain Caimi, who spoke so little and fought so well, was captured.”<sup>387</sup>

**TABLE 29. DEUTCH-ITALIENISCHEN PANZERARMEE'S ESTIMATE OF 8<sup>th</sup> ARMY LOSSES FOR OPERATION LIGHTFOOT<sup>388</sup>**

	Prisoners	Tanks	Armored Cars	Universal Carriers	Guns	AT Guns	Trucks	Aircraft	Remarks
DAK	305	150	7	17	2	41	-	3	Plus at least another 80 tanks 'probably' destroyed
90 <sup>th</sup> Light	64	16							
164 <sup>th</sup> Light	38					1			
104 <sup>th</sup> ARKO	5	51		3	4	3	28	1	
It. X Corps	100	34	6	4				2	1 additional aircraft 'probable'
It. XX Corps	213	32	3	19			36		Plus 57 tanks, 7 armored cars, 6 universal carriers and 55 trucks damaged
It. XXI Corps	73	44	5	13			5	2	
Total	798	327	21	56	6	45	69	8	

**TABLE 30. MINES AND DEMOLITIONS ISSUED BY THE PANZERARMEE, 26-31 OCTOBER**

UNIT	ANTITANK MINES	ANTIPERSONNEL MINES	DEMOLITIONS
DAK	2,250 (incl. 750 V3)		200 kg
90 <sup>th</sup> Light Division	2,800		
164 <sup>th</sup> Light Division	8,250 (incl. 2,000 B2 & 750 V3)	2,000	1,600 kg
It. X Corps	11,000 (incl. 10,000 V3)		3,000 kg
It. XXI Corps	7,365 (incl. 450 B2 & 5,000 V3)		3,000 kg
TOTAL	31,665 (incl. 2,450 B2 & 16,350 V3)	2,000	7,800 kg

#### 6.11.5. XXX CORPS LOSSES DURING OPERATION LIGHTFOOT

By dawn, 26 October, XXX Corps had lost about 4,640 men of the 6,140 men lost thus far by the 8<sup>th</sup> Army. The green 51<sup>st</sup> Highland Division had had it the worst, losing nearly 2,000 men, while the Australians and New Zealanders had each lost about 1,000 men. The South Africans had lost about 600 men. Since few replacements were available for the South Africans and New Zealanders, General Montgomery had to be sparing with his

infantry.<sup>389</sup> Brigadier Currie's 9<sup>th</sup> Armoured Brigade had also been reduced to only 36 Shermans and Grants in operating condition of their original 122 tanks. This was less than 30% of their initial strength.<sup>390</sup>

#### 6.11.6. X CORPS LOSSES DURING OPERATION LIGHTFOOT

Though Allied tank losses appeared heavy, many of the tanks, in fact, had suffered only minor damage or breakdowns and were in positions where they could be recovered and repaired. The 1<sup>st</sup> Armoured Division had lost about 24 tanks on 25 October and, by evening, the total number of operational tanks in the 2<sup>nd</sup> and 24<sup>th</sup> Armoured Brigades (the latter now reassigned to the 1<sup>st</sup> Armoured Division) was 189, while the 8<sup>th</sup> Armoured Brigade was down to 65. The four battalions of Valentines from the 23<sup>rd</sup> Armoured Brigade, which had been attached to the infantry divisions, still had over 150 tanks in operating condition.<sup>391</sup> By the evening of 26 October, about 300 Allied tanks had been knocked out (127 heavy tanks (Shermans and Grants), 28 Crusader IIIs, 77 other Crusaders, 39 Valentines, and 31 Stuarts), of which 93 were already in the workshops for repair. In addition, X Corps had lost 460 men (killed, wounded and missing). Altogether, about 900 operational tanks were still available to the 8<sup>th</sup> Army.<sup>392</sup>

#### 6.11.7. LUFTWAFFE

The night of 27-28 October, during which the 2<sup>nd</sup> New Zealand Division redeployed for Operation Supercharge, was enlivened by the activities of Axis aircraft, some of which scattered SD-2 Butterfly antipersonnel mines while others circled overhead dropping the occasional heavy bombs. At dawn, Ju-87 Stukas and medium bombers were briefly active. During the night of 29 October, a butterfly mine damaged a tractor of H Troop, 43<sup>rd</sup> New Zealand Battery, and it had to be sent back to the maintenance workshops. As a counter-battery measure on 31 October, *Luftwaffe* aircraft flew over the Allied gun areas, dropping butterfly mines, and occasionally heavier bombs, in an effort to check the firing. They wounded one man in the 6<sup>th</sup> Field Artillery Regiment.<sup>393</sup>

#### 6.11.8. 8<sup>th</sup> ARMY REDEPLOYS FOR OPERATION SUPERCHARGE

Although Operation Lightfoot had not developed, tactically, as General Montgomery had hoped, the Axis leadership had been helpful by committing their limited armored units in a series of wasteful counterattacks against dug in Allied forces. Indeed, the 'dogfight' phase lasted two weeks, just as General Montgomery had predicted. In fact, the decision by the *panzerarmee* to fight to retain its original main line of defense along Miteiriya Ridge had caused the 'crumbling' effect that General Montgomery desired. However, in order to accomplish his objective of defeating the *panzerarmee*, it was apparent that a new operation was required, one that would finally breach the Axis defenses. This was to be Operation Supercharge, which General Montgomery planned to launch in the zones of the 9<sup>th</sup> Australian and 51<sup>st</sup> Highland divisions. This plan called for the 8<sup>th</sup> Army to attack toward the high ground of Tel el Aqqaqir on the night of 1 November. In order to prepare for this attack, General Montgomery regrouped his units, pulling the 10<sup>th</sup> Armoured Division and the 2<sup>nd</sup> New Zealand Division out of the line at Miteiriya Ridge.

## CHAPTER ENDNOTES

<sup>1</sup> Monty, *The Making of a General, 1887-1942*, page 763.

<sup>2</sup> *The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV*, by I.S.O. Playfair, HMSO, London, 1966.

<sup>3</sup> Monty, *The Making of a General, 1887-1942*, page 764.

<sup>4</sup> *The New Zealand Infantry Division in Egypt and Libya, Operations "Lightfoot" and "Supercharge,"* pages 1 to 3.

<sup>5</sup> *26 Battalion*, by Frazer D. Norton, Official History of New Zealand in the Second World War 1939-45, War History Branch, Department of Internal Affairs, Wellington, New Zealand, 1952, page 185.

<sup>6</sup> *El Alamein*, page 105.

<sup>7</sup> *Alam Halfa and Alamein*, pages 233-237.

<sup>8</sup> *The New Zealand Infantry Division in Egypt and Libya, Operations "Lightfoot" and "Supercharge,"* page 5.

<sup>9</sup> *The Turning Point, With the N. Z. Engineers at El Alamein*, page 182.

<sup>10</sup> *New Zealand Engineers, Middle East*, pages 347-349.

<sup>11</sup> *New Zealand Engineers, Middle East*, page 347.

<sup>12</sup> *Infantry Brigadier*, by Major-General Sir Howard Kippenberger, Oxford University Press, New York, 1949, pages 222-223. Also see *Alam Halfa and Alamein*, pages 220-221.



- <sup>13</sup> Infantry Brigadier, pages 221-222. Also see The New Zealand Division in Egypt and Libya, Operations "Lightfoot" and "Supercharge," page 2, which gives a slightly different version of the quote. For the most detailed account, see The Turning Point, With the N. Z. Engineers at El Alamein, pages 167-176.
- <sup>14</sup> Extracted from Stout's New Zealand Medical Service in Middle East and Italy, Official History of New Zealand in the Second World War 1939-1945, War History Branch, Department of Internal Affairs, Wellington, 1956, p. 382-401.
- <sup>15</sup> Infantry Brigadier, pages 224-225.
- <sup>16</sup> Based on Alamein, pages 178-180 and 191-192 unless otherwise noted.
- <sup>17</sup> The New Zealand Infantry Division in Egypt and Libya, Operations "Lightfoot" and "Supercharge," page 9.
- <sup>18</sup> "Mine Clearance-El Alamein," page 194.
- <sup>19</sup> Le Operazioni in Africa Settentrionale, Vol III-El Alamein, page 730.
- <sup>20</sup> Alam Halfa and Alamein, page 246-247.
- <sup>21</sup> "The Assault at Alamein," page 318.
- <sup>22</sup> 24 Battalion, by R. M. Burdon, Official History of New Zealand in the Second World War 1939-45, War History Branch, Department of Internal Affairs, Wellington, New Zealand, 1953, pages 125-126.
- <sup>23</sup> New Zealand Engineers, Middle East, pages 348 and 356.
- <sup>24</sup> Alamein, page 180.
- <sup>25</sup> 25 Battalion, by Lieutenant-General Sir Edward Puttick, Official History of New Zealand in the Second World War 1939-45, War History Branch, Department of Internal Affairs, Wellington, New Zealand, 1960, pages 224-225.
- <sup>26</sup> Divisional Cavalry, by R. J. M. Loughnan, Official History of New Zealand in the Second World War 1939-45, War History Branch, Department of Internal Affairs, Wellington, New Zealand, 1963, page 230.
- <sup>27</sup> 25 Battalion, page 225.
- <sup>28</sup> "The Assault at Alamein," page 323.
- <sup>29</sup> "Notes on Eighth Army Minefield Clearance," Military Reports on the United Nations, No. 5, Military Intelligence Service, War Department, Washington, D. C., 15 April 1943, page 23.
- <sup>30</sup> Alam Halfa and Alamein, pages 250-251.
- <sup>31</sup> The New Zealand Infantry Division in Egypt and Libya, Operations "Lightfoot" and "Supercharge," pages 3 and 6.
- <sup>32</sup> Foxes of The Desert, The Story of the Afrika Korps, page 273.
- <sup>33</sup> Alamein, 1933-1962, An Italian Story, page 208, and Le Operazioni in Africa Settentrionale, Vol III-El Alamein, pages 724-727.
- <sup>34</sup> Alam Halfa and Alamein, page 250.
- <sup>35</sup> War in the Desert, South African Forces, World War II, Volume III, page 425, and Alamein, 1933-1962, An Italian Story, page 46.
- <sup>36</sup> Kriegstagebuch, 15<sup>th</sup> Panzer Division, Frames 51 and 54.
- <sup>37</sup> Tobruk and El Alamein, page 645-646.
- <sup>38</sup> Foxes of The Desert, The Story of the Afrika Korps, photo 41 opposite page 243. See also, Kriegstagebuch, 15<sup>th</sup> Panzer Division.
- <sup>39</sup> Erinnerungen, pages 172 and 173, and The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, pages 26-27.
- <sup>40</sup> Alamein, 1933-1962, An Italian Story, page 208.
- <sup>41</sup> Infantry Brigadier, page 226, also see Alamein, page 172.
- <sup>42</sup> Alamein, page 131.
- <sup>43</sup> Infantry Brigadier, page 220.
- <sup>44</sup> El Alamein, Ultra and the Three Battles, by Alexander McKee, Souvenir Press, London, 1991, page 148.
- <sup>45</sup> New Zealand Engineers, Middle East, page 350.
- <sup>46</sup> New Zealand Engineers, Middle East, pages 347-349.
- <sup>47</sup> Infantry Brigadier, pages 224-225.
- <sup>48</sup> New Zealand Engineers, Middle East, page 350.
- <sup>49</sup> Divisional Cavalry, page 230.
- <sup>50</sup> "A Short History of 45 (Leeds Rifler) Royal Tank Regiment," The Tank 31 (365), page 423 as quoted in North Africa, 1940-1943, Appendixes, Landmine and Countermining Warfare, pages K-58 to K-62.
- <sup>51</sup> Alam Halfa and Alamein, page 253.
- <sup>52</sup> Brigadier Frederick Kisch, Soldier and Zionist, page 165.
- <sup>53</sup> Alam Halfa and Alamein, page 253.
- <sup>54</sup> For example, see Divisional Cavalry, page 231, for their approach march along 'Boat.'
- <sup>55</sup> Alam Halfa and Alamein, pages 265-266.
- <sup>56</sup> Alamein, page 193.
- <sup>57</sup> The Turning Point, With the N. Z. Engineers at El Alamein, pages 179-180.
- <sup>58</sup> Divisional Cavalry, page 230.
- <sup>59</sup> New Zealand Engineers, Middle East, page 350.
- <sup>60</sup> McKee, page 141.



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- <sup>61</sup> 26 Battalion, page 187.
- <sup>62</sup> 26 Battalion, page 188.
- <sup>63</sup> The Turning Point, With the N. Z. Engineers at El Alamein, page 181.
- <sup>64</sup> 24 Battalion, page 125.
- <sup>65</sup> 26 Battalion, page 188.
- <sup>66</sup> The Turning Point, With the N. Z. Engineers at El Alamein, pages 181-182.
- <sup>67</sup> Alam Halfa and Alamein, page 266.
- <sup>68</sup> Infantry Brigadier, page 227.
- <sup>69</sup> War in the Desert, South African Forces, World War II, Volume III, page 418.
- <sup>70</sup> Infantry Brigadier, page 227.
- <sup>71</sup> Infantry Brigadier, pages 227.
- <sup>72</sup> 26 Battalion, page 188.
- <sup>73</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, pages 33-34.
- <sup>74</sup> Alam Halfa and Alamein, page 256.
- <sup>75</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, pages 35-36.
- <sup>76</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 36.
- <sup>77</sup> 2<sup>nd</sup> New Zealand Divisional Artillery, page 378.
- <sup>78</sup> 2<sup>nd</sup> New Zealand Divisional Artillery, page 374.
- <sup>79</sup> 2<sup>nd</sup> New Zealand Divisional Artillery, page 378.
- <sup>80</sup> 2<sup>nd</sup> New Zealand Divisional Artillery, pages 377-383.
- <sup>81</sup> Based on Alamein, pages 178-180 and 191-192 unless otherwise noted.
- <sup>82</sup> "Minefield Clearance-El Alamein," page 197.
- <sup>83</sup> Alam Halfa and Alamein, pages 192-195.
- <sup>84</sup> "The Assault at Alamein," pages 325-326.
- <sup>85</sup> "The Assault at Alamein," pages 324-325 and "Mine Clearance-El Alamein," page 195.
- <sup>86</sup> Brigadier Frederick Kisch, Soldier and Zionist, page 169.
- <sup>87</sup> The Memoirs of Field-Marshal the Viscount Montgomery of Alamein, page 118.
- <sup>88</sup> Die 5. (lei.) 21. Panzer Division in Nordafrika, 1941-1943, pages 278-279.
- <sup>89</sup> Based on 2<sup>nd</sup> New Zealand Divisional Artillery, pages 383-385, unless otherwise noted.
- <sup>90</sup> New Zealand Engineers, Middle East, page 350-351.
- <sup>91</sup> The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, page 36; Alam Halfa and Alamein, page 253; Infantry Brigadier, page 228; 26 Battalion, page 188; 25 Battalion, pages 225-226; Divisional Cavalry, page 231; Alamein, 1933-1962, An Italian Story, page 210.
- <sup>92</sup> Foxes of The Desert, The Story of the Afrika Korps, page 285.
- <sup>93</sup> MS # D-348, page 5. Schlachtbericht, 15<sup>th</sup> Panzer Division, and 164<sup>th</sup> Infantry Division Gefechtsbericht, series T-315, Roll 1474, frame 951.
- <sup>94</sup> Kriegstagebuch, 15<sup>th</sup> Panzer Division, series T-315, Roll 666.
- <sup>95</sup> "Die Schlacht von El Alamein," by Generalleutnant Graf Theodor von Sponeck, MS # D-165, Foreign Military Studies, Headquarters, US Army Europe, 1947, page 9.
- <sup>96</sup> Based on 24 Battalion, pages 125-128 unless otherwise noted.
- <sup>97</sup> 25 Battalion, page 226-227, and 26 Battalion, page 188.
- <sup>98</sup> 25 Battalion, pages 226-227.
- <sup>99</sup> The Turning Point, With the N. Z. Engineers at El Alamein, page 185.
- <sup>100</sup> War in the Desert, South African Forces, World War II, Volume III, page 418.
- <sup>101</sup> Alam Halfa and Alamein, page 268.
- <sup>102</sup> War in the Desert, The Eighth Army at El Alamein, page 167.
- <sup>103</sup> New Zealand Engineers, Middle East, page 353.
- <sup>104</sup> The Turning Point, With the N. Z. Engineers at El Alamein, page 186.
- <sup>105</sup> 23 Battalion, by Angus Ross, Official History of New Zealand in the Second World War 1939-45, War History Branch, Department of Internal Affairs, Wellington, New Zealand, 1959, page 202.
- <sup>106</sup> 28 Battalion, by Joseph F. Cody, Official History of New Zealand in the Second World War 1939-45, War History Branch, Department of Internal Affairs, Wellington, New Zealand, 1956, page 232.
- <sup>107</sup> New Zealand Engineers, Middle East, pages 353-354.
- <sup>108</sup> Alam Halfa and Alamein, page 274.
- <sup>109</sup> Alamein, pages 180-181.
- <sup>110</sup> The Turning Point, With the N. Z. Engineers at El Alamein, pages 186-187.
- <sup>111</sup> 28 Battalion, page 232.

- 112 New Zealand Engineers, Middle East, page 353 and Alam Halfa and Alamein, page 274.
- 113 Alam Halfa and Alamein, page 266.
- 114 24 Battalion, page 128.
- 115 War in the Desert, The Eighth Army at El Alamein, page 173.
- 116 Alamein, page 174.
- 117 New Zealand Engineers, Middle East, page 353.
- 118 The Turning Point, With the N. Z. Engineers at El Alamein, pages 186-187.
- 119 The Turning Point, With the N. Z. Engineers at El Alamein, pages 187-189.
- 120 23<sup>rd</sup> Battalion, page 199-210.
- 121 Based on "Mine Clearance-El Alamein," pages 194 to 197, and "The Assault at Alamein," pages 318-333, unless otherwise noted.
- 122 "Minefield Clearance-El Alamein," page 197.
- 123 "The Breaching of the Minefields at Alamein," CCTV Section, RSME, The Services Sound and Vision Corporation, Chalton Grove, Gerrards Cross, Bucks, Great Britain.
- 124 El Alamein, Ultra and the Three Battles, page 145.
- 125 Kriegstagebuch, 15<sup>th</sup> Panzer Division.
- 126 "Schlachtbericht, Deutsch-Italienischen Panzerarmee, 23. Oktober 1942 – 23. Februar 1943," T-313, Roll 470, 1<sup>st</sup> frame 8,768,497.
- 127 "Die Schlacht von El Alamein," by Generalleutnant Theodor von Sponeck, MS# D-165, Foreign Military Studies, Headquarters, US Army Europe, 1947, page 9. See also Alam Halfa and Alamein, pages 288-289 and Monty, The Making of a General, 1887-1942, page 775.
- 128 Rommel Papers, page 303, "El Alamein," by Fritz Bayerlein, in The Fatal Decisions, page 111, and Rommel, A Narrative & Pictorial History, page 191.
- 129 Alam Halfa and Alamein, page 254.
- 130 2<sup>nd</sup> New Zealand Divisional Artillery, page 385.
- 131 Alam Halfa and Alamein, pages 235-236.
- 132 2<sup>nd</sup> New Zealand Divisional Artillery, page 385.
- 133 2<sup>nd</sup> New Zealand Divisional Artillery, pages 384-385, and Alam Halfa and Alamein, page 236.
- 134 2<sup>nd</sup> New Zealand Divisional Artillery, page 385.
- 135 Foxes of The Desert, The Story of the Afrika Korps, page 286, Alam Halfa and Alamein, page 268, and 25 Battalion, page 226.
- 136 2<sup>nd</sup> New Zealand Divisional Artillery, page 385.
- 137 25 Battalion, page 227, and Alam Halfa and Alamein, pages 267-270.
- 138 25 Battalion, page 224.
- 139 Alam Halfa and Alamein, page 274.
- 140 New Zealand Engineers, Middle East, page 353.
- 141 26 Battalion, page 186.
- 142 24 Battalion, page 125.
- 143 28 Battalion, pages 232-233.
- 144 Alam Halfa and Alamein, page 235, 24 Battalion, page 128, 25 Battalion, page 227, and 26 Battalion, page 188.
- 145 Edited from 25 Battalion, pages 227-230, unless otherwise noted.
- 146 New Zealand Engineers, Middle East, page 353, and War in the Desert, The Eighth Army at El Alamein, page 173.
- 147 New Zealand Engineers, Middle East, pages 354-355, and Alam Halfa and Alamein, page 273.
- 148 War in the Desert, The Eighth Army at El Alamein, page 173.
- 149 Alam Halfa and Alamein, page 274.
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- <sup>213</sup> New Zealand Engineers, Middle East, pages 353 and 355.
- <sup>214</sup> New Zealand Engineers, Middle East, pages 355-356.
- <sup>215</sup> New Zealand Engineers, Middle East, page 354.
- <sup>216</sup> 26 Battalion, page 196.
- <sup>217</sup> Alam Halfa and Alamein, page 274.
- <sup>218</sup> 27 (Machine Gun) Battalion, page 281.
- <sup>219</sup> New Zealand Engineers, Middle East, page 356, Alam Halfa and Alamein, pages 274- 275, 25 Battalion, page 230, Infantry Brigadier, pages 231-232, Alamein, pages 174-176.
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- <sup>225</sup> Infantry Brigadier, page 235, The Destruction of Axis Forces in Africa, The Mediterranean and Middle East, Volume IV, pages 37-39, and Tobruk and El Alamein, pages 672-673.
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- <sup>228</sup> Salute the Sappers, Part I. The Formation of the South African Engineer Corps and its Operations in East Africa and the Middle East to the Battle of Alamein, by Neil Orpen with H. J. Martin, Sappers Association, Johannesburg, South Africa, 1981, page 449.
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- <sup>244</sup> Alam Halfa and Alamein, pages 289-290, and Tobruk and El Alamein, page 675.
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- <sup>248</sup> Alamein, 1933-1962, An Italian Story, pages 213-214.
- <sup>249</sup> Alam Halfa and Alamein, page 290.
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- 339 2<sup>nd</sup> New Zealand Divisional Artillery, pages 391-392.
- 340 2<sup>nd</sup> New Zealand Divisional Artillery, pages 391-392.
- 341 Divisional Cavalry, pages 234-235.
- 342 25 Battalion, page 232.
- 343 The New Zealand Division in Egypt and Libya, Operations "Lightfoot" and "Supercharge", page 9, and Alam Halfa and Alamein, page 316. General Freyberg credits the 9<sup>th</sup> Armored Brigade with 300 prisoners for this attack, the New Zealand Official History says 200. See also "War Diary for the Month of October, 1942. Volume 38. Warwickshire Yeomanry," pages 2-3.
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- 345 Alamein, 1933-1962, An Italian Story, page 217.
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- 387 Alamein, 1933-1962, An Italian Story, page 216.
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- 393 2<sup>nd</sup> New Zealand Divisional Artillery, pages 397, 401.

## 7. AFTERMATH AND RESULTS

### 7.1. THE DEFEAT AND RETREAT OF THE *PANZERARMEE*

By 2 November, after a series of futile counterattacks, the *Deutsches Afrika Korps* was down to only 35 serviceable tanks against almost 600 operational Allied tanks. At this point, *Generalfeldmarshall* Rommel realized that he could not stop General Montgomery. The 8<sup>th</sup> Army was just too powerful. On 3 November, the *panzerarmee* reported that their infantry, *panzerjaeger*, and pioneer units had been reduced to about 50%, the artillery to 40% and the panzers to 24 operational tanks.<sup>1</sup> On this day, *Generalfeldmarshall* Rommel ordered his foot-mobile Italian infantry divisions to retreat, while the remnants of his motorized divisions attempted to delay the Allied advance. The 90<sup>th</sup> *Leicht Afrika* Division was ordered to prepare to conduct a fighting withdrawal along the coast road. The remnants of the *Afrika Korps* were tasked with protecting their southern flank. Major Kuba's 900<sup>th</sup> Pioneer Battalion was tasked with mining the coast road and the railway.<sup>2</sup> The infantry had already left their positions behind the "Devil's Gardens" and begun to move west when, at 1330, an order arrived from Hitler.

*To Field Marshal Rommel*

*It is with trusting confidence in your leadership and the courage of the German-Italian troops under your command that the German people and I are following the heroic struggle in Egypt. In the situation in which you find yourself there can be no other thought but to stand fast, yield not a yard of ground and throw every gun and every man into the battle. Considerable air force reinforcements are being sent to C.-in-C. South. The Duce and the Commando Supremo are also making the utmost efforts to send you the means to continue the fight. Your enemy, despite his superiority, must also be at the end of his strength. It would not be the first time in history that a strong will has triumphed over bigger battalions. As to your troops, you can show them no other road than that to victory or death.*

Adolf Hitler

After much soul-searching, *Generalfeldmarshall* Rommel attempted to halt the retreat of his battered army and to return it to its original positions. Needless to say, chaos ensued. As *Oberst* Bayerlein was preparing to go and set up a new location for the headquarters of the *Afrika Korps* at El Daba, *General der Panzertruppe* von Thoma, a veteran of World War I, the Spanish Civil War and the Russian Front, said to him, "*Bayerlein, the Fuhrer's order is madness. It is the death warrant of the Army. How can I explain it to my men?*"<sup>3</sup> *General der Panzertruppe* von Thoma had put on his finest uniform and decorations. Then, like a chivalrous knight of old, he mounted his panzer to lead the last of his men in a last, vainglorious battle near Tel el Mampsra on the morning of 4 November. His tank was soon knocked out by Allied fire and *General der Panzertruppe* von Thoma was captured by Captain Singer of the 10<sup>th</sup> Hussars Regiment. As a result, *Oberst* Bayerlein assumed temporary command of the *Afrika Korps*.<sup>4</sup> By now, many of the German formations had been reduced to skeletons and many of the Italians ones had disintegrated. The *Trento* and *Littorio* divisions had been almost wiped out. On 4 November, only 36 German tanks remained operational (including some of the light Panzer IIs), out of 276 at the beginning of the battle. The Italians had also lost almost all of their 301 tanks, about half of them (from the *Ariete* Armored Division) being destroyed by the 7<sup>th</sup> Armoured Division on this day.

Finally, in the afternoon, the Allies broke through, forcing *Generalfeldmarshall* Rommel to disobey Hitler's order and retreat to the west. At 1530 on 4 November, *Generalfeldmarshall* Rommel ordered an immediate retreat to Fuka, 100 kilometers to the west. Finally, after many urgent messages from *Generalfeldmarshalls* Rommel and Kesselring, Hitler finally rescinded his order on the morning of 5 November. This 24-hour postponement resulted in the loss of almost all of the *panzerarmee's* infantry and much badly needed equipment. The retreat quickly degenerated into a rout. For the next few days, while the retreat was in progress, *Generalfeldmarshall* Rommel had little idea of what he had left. It was not until 6 November that *Generalfeldmarshall* Rommel was able to assert any level of control, near Mersa Matruh. At this point, he directed that the retreat should continue as quickly as possible. Panzer Grenadier Regiment *Afrika*, attached to the 90<sup>th</sup> *Leicht Afrika* Division, was assigned the task of providing the rearguard. Meanwhile, the rest of the *panzerarmee* continued its retreat, the *Afrika Korps* to Sidi Barrani, the Italian XX Corps to Buq Buq, and the Italian XXI Motorized Corps to Capuzzo in Libya. Now, the important thing was to escape from the Royal Air Force. That night, the skies opened up; severely hampering the timid Allied pursuit and giving the *panzerarmee* some badly

needed breathing space (Photo 83). In addition, the pioneers were able to emplace at least 2,188 antitank mines during their retreat to the Libyan border.<sup>i</sup>



**PHOTO 83. Grant Tanks In The Rain, 6 November**

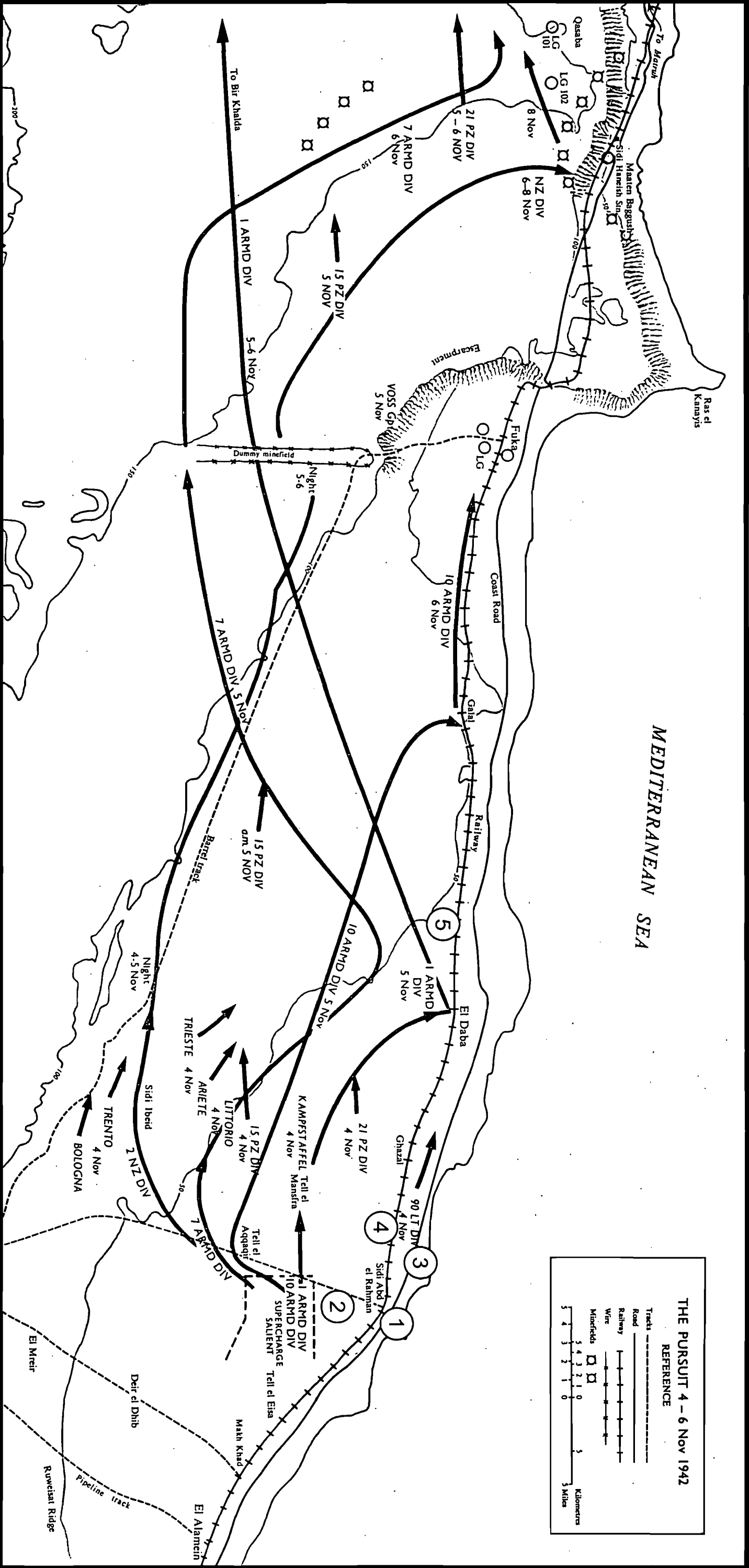
**TABLE 31. GERMAN PIONEER EFFORT IN THE RETREAT  
FROM EL ALAMEIN TO THE LIBYAN BORDER<sup>5</sup>**

LOCATION	POINT	TARGET	EFFORT
Sidi Abd el Rahman	①	Army Engineer Park	Destroyed
SSE of Sidi Abd el Rahman	②		600 antitank mines
Between Sidi Abd el Rahman and el Daba	③	Railroad	102 dummy demolitions charges
Between Sidi Abd el Rahman and 13 kilometers west of el Daba	④	Coast Road	555 antitank mines
Between el Daba and Fuka	⑤	Railroad	245 antitank mines and 17 dummy demolitions charges
El Qasaba	⑥	Airfield	650 antitank mines
Around Marsa Matruk	⑦		50 antitank mines
Within Marsa Matruk	⑧		38 antitank mines
SSW of Marsa Matruk	⑨	Gaps through old minefields	4 gaps mined after elements of the <i>panzerarmee</i> had withdrawn through them
Between Marsa Matruk and Sidi Barani (kilometer marker 64.5)	⑩	Coast Road	30 antitank mines
Between Marsa Matruk and Sidi Barani (kilometer marker 69)	⑪	Coast Road	20 antitank mines
Between Marsa Matruk and Sidi Barani (kilometer marker 92)	⑫	Water Supply	7 wells demolished
Between Marsa Matruk and Capuzzo	⑬	12-15 locations	Mined
Total			2188 antitank mines emplaced

<sup>i</sup> This is a rather abbreviated account of a complex series of events. For more information, see *The Rommel Papers*, pages 320-326, and "Der Ruckzug der deutsche italienische Panzerarmee nach der Schlacht von El Alamein in die Mars el Brega Stellung," by Theodor von Sponeck, MS# D-164, Foreign Military Studies, Headquarters, US Army Europe, March 1947, pages 3-5.



However, during their withdrawal from Egypt, Axis engineers had been able to execute comparatively few demolition or mining missions (Table 31 and Map 20). Most of their attention had been focused on the water supply system and railroad. Much of the pipeline, which had been laid earlier by the 8<sup>th</sup> Army, was out of action.<sup>6</sup> The initial attempts to organize a rearguard were not particularly successful as a number of pioneers were captured by the 6<sup>th</sup> New Zealand Brigade at Mersa Matruh while in the act of setting their demolitions and booby traps. Sappers from No. 3 Section from Major Reid's 8<sup>th</sup> Field Company cleared this area. The clearance of 550 kilometers of railroad from El Alamein to Bel Hamed required the efforts of three sections of Royal Engineers working for 10 days. In the process, they removed 141 Tellermines, 39 unexploded demolition charges and 3 booby traps.<sup>7</sup>



THE PURSUIT 4 - 6 Nov 1942

REFERENCE

Tracks ————

Road ————

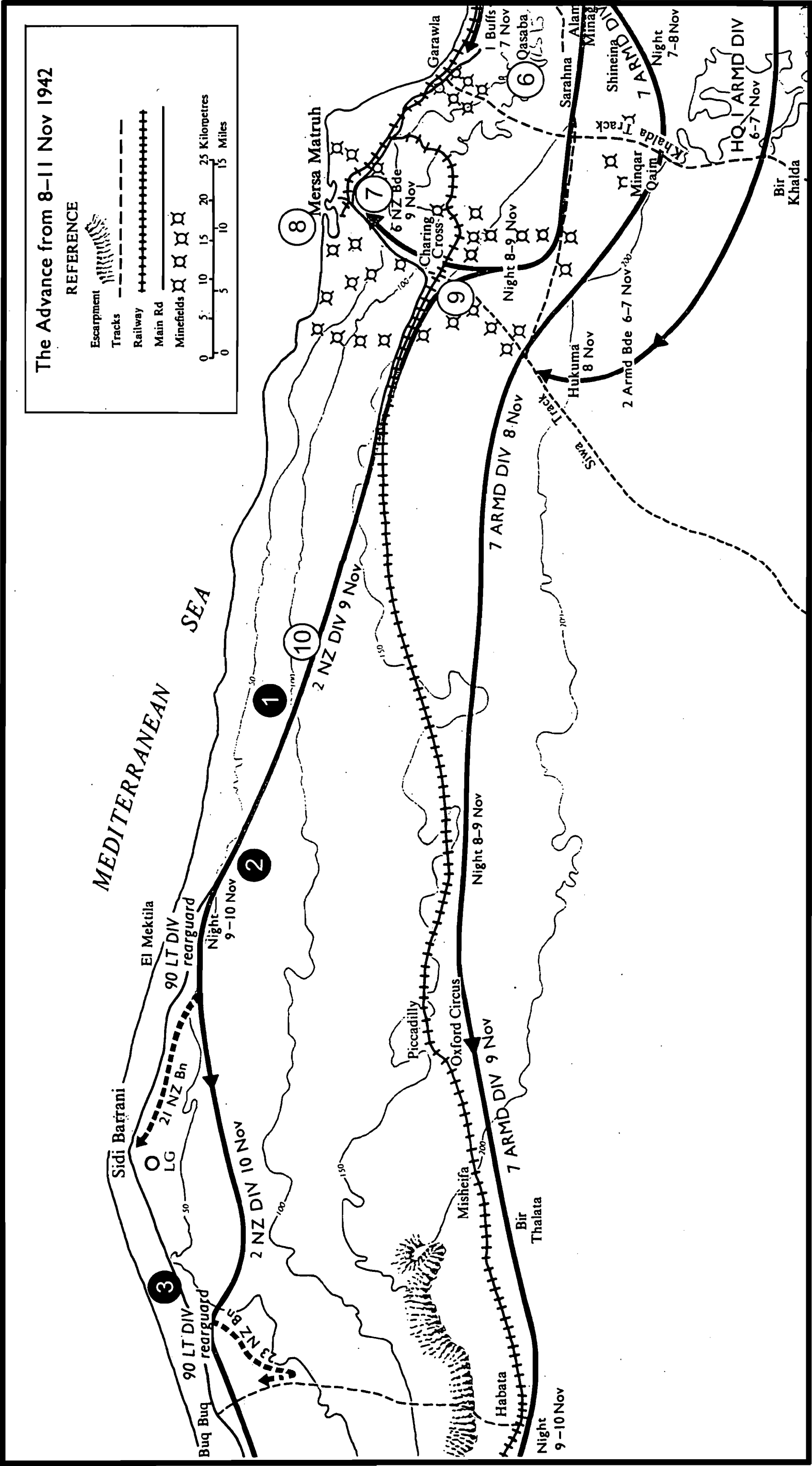
Railway ————

Wire ————

Minefields ————

5 4 3 2 1 0 3 Kilometers

5 4 3 2 1 0 3 Miles



MAP 20. Axis Mine And Demolition Usage During The Retreat From El Alamein

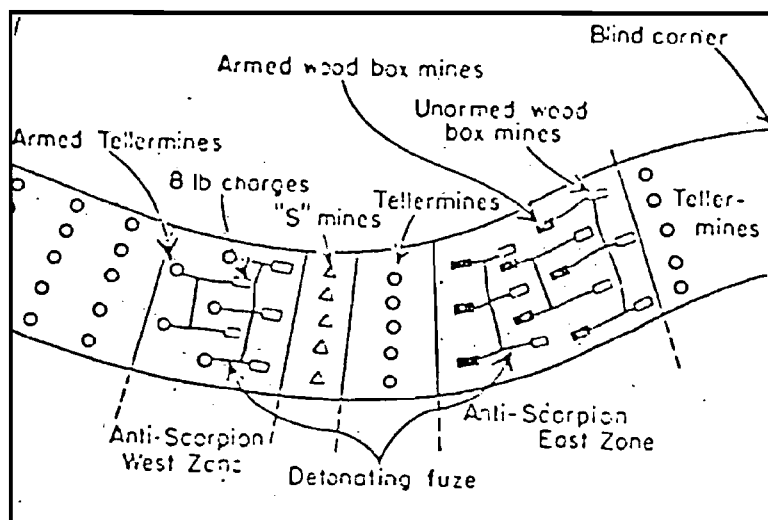


On 8 November, an Anglo-American armada began landing troops in Northwest Africa as part of Operation "Torch," thus creating a serious threat to the *panzerarmee's* rear. That afternoon, a car brought a small, bustling, *generalmajor* to *Generalfeldmarshall* Rommel near the Egyptian frontier. It was Karl Buelowius (Photo 84), the *panzerarmee's* new senior pioneer. *Generalfeldmarshall* Rommel told him to stop at nothing to delay General Montgomery's pursuit. The *Generalfeldmarshall* assured him that *Generalleutnant* Count von Sponeck's 90<sup>th</sup> *Leicht Afrika* Division would fight a continuous rearguard action while the pioneers (probably from Major Kuba's 900<sup>th</sup> Pioneer Battalion) laid mines and demolished the roads. *Generalmajor* Buelowius seemed totally undeterred by the tactical situation into which he was thrust, positively relishing the intricacies of the mission that faced him. So once more, the German pioneers were called upon to undertake a critical task for *Generalfeldmarshall* Rommel.<sup>1</sup> That night, after No. 2 Company, 220<sup>th</sup> Pioneer Battalion arrived at Fort Capuzzo in Libya, Sergeant-Major Ohler reported to *Leutnant* Pfanzagel, "*Company reporting with 28 men.*" Six months before, they had arrived from Crete with a full complement of over 200 pioneers,<sup>8</sup> the remnants of the battalion were now detached from their division and assigned to *Generalmajor* Buelowius. On 9 November, the rearguard regiment of the 90<sup>th</sup> *Leicht Afrika* Division fighting 40 kilometers east of Sidi Barani destroyed four tank and four armored cars of the pursuing 8<sup>th</sup> Army. On this day, *Generalfeldmarshall* Rommel directed *Generalmajor* Buelowius to prepare at least three thirty meter wide gaps for the retreating *panzerarmee* through the old minefields and antitank ditch near Gazala. *Hauptmann* Hinrichs' 33<sup>rd</sup> Panzer Pioneer Battalion was tasked with this mission. *Generalmajor* Buelowius was also told to prepare the switchback at Derna for demolition, using charges that could not be prematurely detonated by Allied bombing. The authority to execute this demolition was reserved to the headquarters of the *panzerarmee*. By the evening, the *Afrika Korps* and the Italian XX Corps had reached the area around Capuzzo and Sidi Azeiz.<sup>9</sup>

From the Egyptian frontier westwards, the efforts of the German pioneers to obstruct the advance of the 8<sup>th</sup> Army became better organized, consequently, many bridges and roads were blown and mined. The temporary defense of the border position around Sidi Omar, Halfaya and Sollum was the responsibility of the Italian XXI Corps. Two battalions from the Italian Pistoia Division, a third "battalion" of stragglers from the remnants of the Italian XXI Corps, and three artillery battalions were all that was allotted to the task.<sup>10</sup> On 10 November, the rear guard of the 90<sup>th</sup> *Leicht Afrika* Division withdrew through Halfaya and Sollum Passes on the Libyan frontier. As soon as they were clear, the pioneers blew-up the road or brought the adjacent cliffs down onto them and mined the area. In the last light of the day, soldiers of Panzer Grenadier Battalion Weissshuhn of the 90<sup>th</sup> *Leicht Afrika* Division watched as the leading Stuarts of the 4/8 Hussars Regiment, 4<sup>th</sup> Light Armored Brigade felt their way through the bottom of Halfaya Pass. Soon, three Stuarts had run over mines and were knocked out. A hundred and ten New Zealanders from the 21<sup>st</sup> Infantry Battalion finally opened the pass the next night. In the process, they surprised and captured 612 prisoners and their equipment (mostly from the Italian Pistoia Division, with a 'stiffening' of Germans) for two casualties.<sup>11</sup> The sappers of Major Jerry Skinner's 7<sup>th</sup> Field Company were then able to begin clearing the way. "*Apart from the winding length of the pass which yielded twenty Tellers, three 40-foot (12-meter) gaps were made through a field at the top. The mines were buried deeply, difficult to detect and booby-trapped with cunning variations; some were laid double with a thin layer of earth separating them so that the simple sapper taking up the top one would think he had removed the menace to the first vehicle that came along. Another variation was one deeply buried mine with a second a few feet away not so deeply down, but connected to the first one so that a pilot vehicle passing safely over No. 1 and exploding No. 2 would then receive the explosion of No. 1. One Pilot was caught in this manner.*"<sup>12</sup> In this trial of wits, where a mistake meant a probable trip to the hospital and a possible memorial service, the sappers gave their German opposite numbers full marks (Sketch 15).<sup>12</sup> The next Axis delaying position was set up near Sidi Azeiz on the Trigh Capuzzo by a battalion from Panzer Grenadier Regiment *Afrika*, but it was compromised when their '88' opened fire prematurely.<sup>13</sup>

<sup>i</sup> "Even during the retreat, the lack of engineer forces was seriously felt." *Desert Warfare: German Experiences in World War II*, page 52.

<sup>ii</sup> Author's note: it seems more likely that these coupled mines were intended to defeat the Scorpions (rather than the pilot vehicles). The Scorpions had attracted the attention of the Germans at El Alamein, and are mentioned in several accounts, the pilot vehicles are not. Obviously, it had taken *Generalfeldmarshall* Rommel's superb pioneers very little time to improvise a countermeasure to this new threat. The pioneers also used this technique in March 1943 at Hallouf Pass during the Battle of Mareth. See *North Africa, 1940-1943, Landmine and Countermine Warfare*, page 177-179 and 183.



**SKETCH 15. Example Of German Use Of Coupled Mines  
To Counter The New British Scorpion Flail Tank**



**PHOTO 84. Generalmajor Karl Buclowius,  
Generalfeldmarshall Rommel's New Senior Pioneer**

As the 8<sup>th</sup> Army continued its advanced into Libya, they found that the pioneers had laid many mines and booby traps. Buildings along the roadside were booby trapped and left waiting for any unwary soldier who sought shelter from the cold autumn. Some critical airfields were left unserviceable for weeks after the Germans had abandoned them. As the *panzerarmee* retreated westward, demolition guard details could be seen squatting by the roadside watching the veterans of the *Afrika Korps* stream past. After the last of the column had passed, the pioneers, often working with Arab road workers under the orders of an Italian NCO, tore up the roads. Then came the usual business: death laid in a checkerboard pattern. The creators, of the 'Devil's Gardens,' now devised new

tricks for this changing game and their new traps were just as ingenious and infernal. In the first belt, it often looked as though real mines had been buried in the road, with filled in holes. The pattern was repeated again and again. But these holes contained no mines, only enough metal to make a detector sound off or occasionally a Tellermine without a detonator, to make it appear as if the pioneers had been forced to leave before their deadly work was complete.<sup>14</sup> Frequently, the pioneers did not have time to mine the hard, rocky surface of the tarred coastal road. In these cases, they often left the shoulders heavily mined. Consequently, the Allied engineers were tasked with clearing 20 feet (6 meters) on both sides of the roadway (photos 85 and 86) as well as a 20 foot strip along the telephone lines.<sup>15</sup>

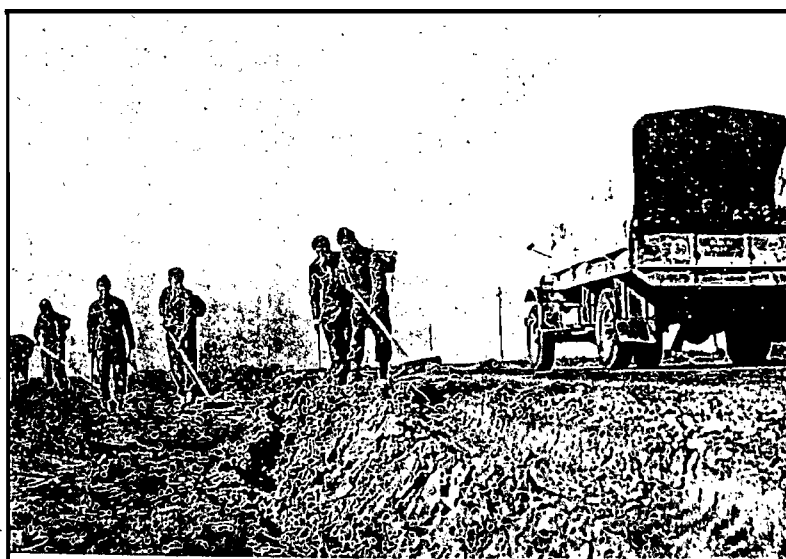
As the British vanguard advanced and the leading scout car spotted a hole in the road, there was inevitably a halt followed by the call "*Sappers to the front!*" British sappers then searched the road with their mine detectors, a warning sound ringing in their ears whenever a detector located the presence of metal. Cautiously, the sappers would check hole after hole, with nothing to show for their efforts but scrap metal. After a certain amount of this tedious work, the local commander would decide that he had wasted enough time and order his soldiers to move out. A short distance later, the party might run over some real mines.<sup>16</sup>

It only took a couple such incidents before the column stopped at every hole in the road. Again, they continued digging scrap metal out of the road until it seemed too ludicrous and once more, haste led to death. As Radio Cairo reported: "*The advance of the 8<sup>th</sup> Army is meeting with little resistance, but is being greatly hampered by the German engineers.*"<sup>17</sup>

Generalfeldmarshall Rommel observed that, "*The British were slow in following up our movements and our sappers found the time and leisure to prepare all kinds of neat little surprises for them.*"<sup>18</sup> However, at Tobruk, which was taken on 13 November, the damage to the harbor was slight. Several critical airfields near Tobruk were captured, those at Tmimi and Gazala on 14 November, while the one at Martuba was taken on 16 November. In each case, the surface had been plowed up and mines laid. It took the Royal Engineers only 48 hours to return these airfields to service. Brigadier Kisch, Chief of Royal Engineers for the 8<sup>th</sup> Army, described his experiences in Tobruk, "*I entered Tobruk soon after the first troops, when one had still to feel the way carefully through mines, at the lifting of which I am, I suppose, among the Army's chief experts, although naturally it is not often that I feel it necessary to do it myself.*" On 17 November, "*At the north-west petrol installation, I found the father and mother of a boobytrap, in which the shifting a petrol drum would have fired a stack of 200 lb. (90 kg) R.A.F. bombs (in a passage of the main underground fuel storage facility) and all the petrol in the locality. Posted a guard while sending for Sappers to deal with it, as it was more than I could tackle alone.*"<sup>19</sup>

Next, the pioneers mined the Martuba by-pass southeast of Derna and blew up the switchbacks at Derna, on the coast road west of Tobruk. A crew of 10 sappers with bayonets and 1 mine detector took 10 days to clear this 60-kilometer stretch of road (including 10 foot of shoulder on each side). For their efforts, they found only eighteen German Tellermines and British GS mines in groups of one to four at a distance of about one meter from the edge of the road.<sup>20</sup> The Allies captured Benghazi, the other important port in eastern Libya, on 20 November. Here, the pioneers had badly damaged the facilities; the harbor was useless for unloading ships of any size for two weeks, until 5 December. By 22 November, most of the *panzerarmee* was able to stop and rest for a short time at El Agheila. In this area, Brigadier Kisch found that the roads and tracks were very heavily mined with Tellermines and S-mines.<sup>21</sup> Mussolini, the Italian dictator, commended Generalfeldmarshall Rommel on the successful escape of his army, saying, "*Your withdrawal was a masterpiece.*"<sup>22</sup> Nevertheless, Generalfeldmarshall Rommel noted the critical contribution of his engineers, writing "*Throughout our retreat we called on all our resources of imagination to provide the enemy with ever more novel booby traps and thus induce the maximum possible caution in his advance guard. Our Engineer Commander, General Buelowius, one of the best engineers in the German Army, did a splendid job.*"<sup>23</sup>





**PHOTO 85. New Zealand Sappers Sweep The Roadsides For Mines Using A Goldak Mine Detector**



**PHOTO 86. After Removing One Tellermine 35, A New Zealand Sapper Probes With His Bayonet For A Second Mine Beneath**

In a few instances, in heavily mined areas such as airfields, one of the nineteen surviving Scorpions was brought forward and put to use. *"The use of Scorpions in dealing with 'S' Mines proved of undoubted value, not only in the actual destruction of a considerable number of mines, but through the encouragement which their participation gave to the rather sorely tried sappers. Since it became evident that antipersonnel mines did considerable damage to the flails of the Scorpions, it was found necessary to carry a large supply of spare parts."*<sup>i</sup> Ultimately, six of these Scorpions fell victim to mines in supposedly cleared areas.<sup>24</sup> In other cases, spiked

<sup>i</sup> The clearance of S-mines was particularly dangerous and required constant alertness by the sappers. Several casualties occurred when the search head of the detector activated an S-mine when the operator was indicating where a suspected mine was located or when they were stepping back to take a rest. See "Mine Clearance of Roads by the Eighth Army," page 40.

“Fowler” rollers were used. Indeed, the rollers were sometimes used as mobile protection, behind which a sapper could take cover whenever he had to pull a mine.<sup>25</sup>

As the official history of the Royal Engineers pointed out, *“The rapid repair of airfields was of especial importance. Partly owing to the nature of the terrain, and partly due to the fact that this country had not been fought over previously, there was a scarcity of existing landing grounds and of these the enemy had taken great pains to prevent our early use. It was clear that in his denial schemes the enemy had given up any hope of an early return by his own troops, so the mines which were thickly sown were placed on no regular plan which made them more difficult to locate. He had also half buried in the runways 40-gallon drums attached to anti-lifting devices, and ploughed furrows 6 in. deep and 2 ft. 6 in. wide in curves all over the surface. An example of the work entailed may be given in the task of reinstating the airfield at Merduma West some miles west of Nofilia. Here 625 mines, about equally divided between anti-tank and anti-personnel, and sixty drums were removed by two sections of a field company in forty-eight hours. The work was complicated by the presence of a large number of dummy mines, consisting either of rows of disturbed earth or buried smoke candles to which the detector reacted. Ploughing was not used on this particular field, and its efficacy varied with the nature of the soil, and the time which had elapsed between the completion of the work and the arrival of the repair party. For example ploughing of one field which was situated in a saltpan and reached in the rainy season was sufficient to deny its use for fourteen days; while at another, ploughed in sandy soil with the furrows liberally sown with mines several days before the arrival of our troops, the furrows were completely drifted over by sand so that it was almost impossible to locate the mines by detectors. This landing ground was never used....During the advance from El Alamein nineteen enemy airfields had so far been cleared of mines and reinstated and eight newly constructed.”*<sup>i</sup>

Towards the end of the retreat, the Black Watch Regiment encountered some German mines, not covered by fire, near El Agheila, *“They had been laid with cunning and imagination. One night a truck-load of Middlesex hit an anti-tank mine at a point in the road where there was a deep crater. The survivors, jumping clear, found themselves in an ‘S’ minefield, and were killed. During the night some Camerons sent out a patrol to bring in the bodies; they were fired on, they took cover in the crater, they found it full of mines, and six of them were killed. Once more, the Camerons tried, but this time the Germans had attached ‘S’ mines to the bodies, and three more lives were lost. That particular spot is said to have cost thirty-six lives before it was finally cleared.”*<sup>26</sup> The 115 kilometers between El Agheila and Nofilia required six and a half troop days making bypasses around 20 road craters and seven blown culverts, all liberally protected with mines. Three more craters had to be filled and five unfired demolition charges removed. It took five engineer sections to sweep 25 kilometers of road in one day near El Agheila, clearing an average of about ten Tellermines per kilometer (a total of about 250 mines).<sup>27</sup> German reconnaissance aircraft observed that the road from Mersa el Brega to Nofilia was deserted, so evidently Generalmajor Buelowius’s lethal handiwork was forcing the Allies to make tortuous detours instead.

During this advance, the South African engineers lost two men killed and seven wounded by a single antipersonnel mine (almost certainly an S-mine) at the first road crater that they encountered. Faced with this deadly new game, the sappers began using their bulldozers to fill in subsequent craters, thereby neutralizing the antipersonnel mines by burying them. This experiment worked, although it was very dangerous work for the equipment operator exposed on top his unarmored bulldozer. Each road crater posed a different problem, depending on the skills and time available to the pioneers who prepared it. Techniques that worked well one time, could prove fatal the next. The South African engineers learned their lessons well in the ‘school of hard knocks.’ Although they were only able to fill four craters on each of the first two days, thereafter, as they gained experience

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<sup>i</sup> *History of the Corps of Royal Engineers, Volume VIII*, page 403-404. This airfield was cleared by 1<sup>st</sup> and 2<sup>nd</sup> Sections of the New Zealand 6<sup>th</sup> Field Company, for a more detailed account, see *New Zealand Engineers, Middle East*, pages 379-381. Later, during the advance into Tunisia, *“The trenches and ploughing by which the Germans obstructed the airfields were liberally sown with mines, apart from the large numbers which were concealed on the runways themselves and on dispersion points. They even went so far, with true Teutonic frightfulness, as to dig shallow latrines on the runways in which before use they placed mines. They finally filled them in and made good the surface. It must be remembered that the sapper, after the mine has been detected, has to grub with his hands round and underneath the mine to disconnect any anti-lifting device. Such an experience does not add to the pleasure of an already nerve-racking job.”* *Military Engineering (Field)*, *The Second World War, 1939-1945, Army*, compiled by Major-General R. P. Pakenham-Walsh, British War Office, 1952, page 338. The efforts of the Royal Engineers to reopen captured airfields was certainly successful, as General Toppe observed, *“The mining of airfields by the indiscriminate scattering of mines proved to be effective for a shorter time than had been expected.”* *Desert Warfare: German Experiences in World War II*, page 52.

and confidence, they were able to fill twelve craters on the third day, thirteen on the fourth, and twenty on the fifth. Indeed, by the time they reached Tripoli in January, they had bulldozed in 112 craters on 300 kilometers of road.<sup>28</sup>

During their pursuit, the field companies of the Royal Engineers had managed to clear an average of 20 kilometers of road per day, at a cost of 170 sappers.<sup>29</sup> Effectively, the pioneers had limited the sappers of the fully motorized 8<sup>th</sup> Army to an advance rate equivalent to that of Napoleon's foot marching infantry, over a hundred years before.<sup>30</sup> Colonel Scott, who had served as a Chief of Royal Engineers in the 8<sup>th</sup> Army, wrote, "*Brigadier Kisch was always extremely interested in every new type of mine discovered in the desert, and was anxious to obtain first-hand information. In order to get the facts quickly, he had two methods. The first was to go out himself to the forward area and pick up the mines from enemy minefields. The second was to send his staff officers to the leading formation in order to obtain specimens, so that a detailed report could be made to G.H.Q. without having to wait for reports to come from the Field Companies through the usual channels.*

*I remember at the Marble Arch (east of Tripoli) bringing back a new type of booby trap found on Merduma airfield. The C.E. was jubilant, and at once took the opportunity to demonstrate the mechanism to the assembled staff at Army H.Q.-much to their alarm. I used to be asked often in the evening at dinner whether the C.E. had any infernal machines to exhibit at the morning's conference, and if so, was it safe to attend?"* The daily work of the sappers in the mined areas caused considerable nervous strain, making some men irritable and others reckless. However, as noted by his biographers, Brigadier Kisch, "*on unearthing a particularly beastly and cunning apparatus, would regard it with benevolent interest, looking elderly, respectable and competent, enjoying his work as a man does who is sure that it is good. Many came to know him as the man who beat the mines.*"<sup>31</sup>

The badly mauled *panzerarmee* was able to retreat 2,100 kilometers in 22 days without being cut off and destroyed by the 8<sup>th</sup> Army.<sup>i</sup> With deadly effect, *Generalmajor* Karl Buelowius' pioneers and the men of the 90<sup>th</sup> *Leicht Afrika* Division had bought *Generalfeldmarshall* Rommel the time that he so desperately needed.<sup>ii</sup> *Generalfeldmarshall* Rommel thought so highly of his new senior pioneer that he ordered that *Generalmajor* Buelowius should be one of six men to be flown out, at any cost, to Europe, if the Axis should be forced out of North Africa.<sup>32</sup> However, the battle and retreat had cost the pioneers severely. During the period from 21 October to 20 November, *Hauptmann* Hinrich's 33<sup>rd</sup> Panzer Pioneer Battalion (which had begun the battle with a combat strength of 9 officers, 22 non-commissioned officers, and 179 men) reported the loss of 134 men. This was 64% of their strength. Of these, 1 officer and 19 men were killed, 2 officers and 29 men were wounded, and 2 officers and 81 men were missing. On 22 November, they reported that only the battalion staff and one company were available, with 18 light machine guns, one 3.7 cm Pak 38, and one heavy antitank rifle (sPzBu 41). On 12 December, *Hauptmann* Streitz' 220<sup>th</sup> Pioneer Battalion reported 16 killed, 24 wounded and 88 missing (including 3 officers) out of an initial strength of 11 officers and 315 enlisted personnel, a 40% loss. On 15 December, *Hauptmann* Endress' 200<sup>th</sup> Panzer Pioneer Battalion (of the 21<sup>st</sup> Panzer Division) reported strength of only 3 officers, 12 non-commissioned officers, and 98 enlisted. On 1 November, they had reported 8 officers, 45 non-commissioned officers, and 344 enlisted. This was a loss of 72%.<sup>33</sup>

Upon reaching the Mersa el Brega position, *Generalfeldmarshall* Rommel finally had an opportunity to assess his units. The *Afrika Korps* reported having only 35 panzers (371 authorized), 16 armored cars (60 authorized), 12 antitank guns (246 authorized), 9 light (10.5 cm) howitzers (48 authorized), 3 heavy (15cm)

<sup>i</sup> For an account of route clearance beyond Tripoli, see "Seventy Men. A Troop of Sappers with the Eighth Army in Early 1943," by Nitebar, *The Royal Engineers Journal*, Vol 107, No. 1, The Institution of Royal Engineers, Chatham, April 1993, pages 65-69.

<sup>ii</sup> Karl Buelowius went on to assume command of the remains *Afrika Korps* (then at about division strength) on 17 February 1943, after its commander, *Oberst* Liebenstein was wounded by a mine during the Battle for Kasserine Pass. *Generalmajor* Buelowius was captured when Axis forces in Tunisia capitulated in May of 1943. David Irving in *The Trail of the Fox, The Search for the True Field Marshal Rommel*, on page 240 relates his ultimate fate, "*Buelowius's name features so often in the Rommel diary that I made a strenuous effort to find him. . . (T)he trail came to an abrupt end. Said one of his former officers in Dusseldorf, West Germany: 'He was always a bit of an eccentric-I got the impression that something had once happened to him, years before. He was interned by the Americans in Tennessee with Count von Sponeck and myself. One evening we were sitting with him and he began screaming: 'They're coming for me!' We calmed him down and he seemed quite normal. The next day he went for a walk with Sponeck. Then that evening, he hanged himself with a luggage strap.'*" For an eyewitness account from a German battalion commander with the rearguard, see *With Rommel in the Desert*, pages 179-189. See also the *panzerarmee's Schlachtbericht*, the *Kriegstagebuch* of the 90<sup>th</sup> *Leicht Afrika* Division (20-22 November 1942), and "Der Ruckzug der deutsche italienische Panzerarmee nach der Schlacht von El Alamein in die Mars el Brega Stellung," pages 9 and 10.



howitzers (16 authorized), and 2 10-cm cannons (8 authorized). The 15<sup>th</sup> Panzer Division had been reduced to a combat strength of 72 officers, 1,105 enlisted, less than 10% of their authorized strength. These were organized into three companies (two rifle and one pioneer, with five 5 cm PAK 38s), four artillery batteries (with seven light and four heavy guns), but no battle worthy tanks. The 21<sup>st</sup> Panzer Division had been reduced to a combat strength of 71 officers, 938 enlisted. These were organized into one panzer company (with 11 operational panzers), six companies (five rifle and one pioneer, with four 5 cm PAK 38s), one *panzerjaeger* company (with five 5 cm PAK 38s), three artillery batteries (with six guns, five light and one heavy). The 90<sup>th</sup> *Leicht Afrika* Division had only 4 armored cars (30 authorized), 31 antitank guns, and 7 howitzers, while the 164<sup>th</sup> *Leicht Afrika* Division had only 2 antitank guns (more than 200 authorized). The XIX FLAK Division had 40 8.8-cm AA/AT guns (72 authorized), and 60 2-cm AA guns (225 authorized). *Fallschirmbrigade* Ramcke had 21 antitank guns (102 authorized) and 2 artillery pieces (24 authorized). The 104<sup>th</sup> ARKO was reduced to 24 tubes (56 authorized).<sup>34</sup>

## 7.2. CASUALTIES

### 7.2.1. ALLIED

During the period from 23 October to 4 November, the 8<sup>th</sup> Army lost approximately 2,350 killed, 8,950 wounded, and 2,260 missing; for a total of 13,560 men (Table 32). Of this, British troops accounted for 58%, Australians 22%, New Zealanders 10%, South Africans 6%, Indians 1%, Allies (Free French, Greeks, Poles etc.) 3%. In addition, the *panzerarmee* had knocked some 530 tanks out of action. However, 337 of these were deemed to be repairable, in fact, over 300 damaged tanks had already been returned to service by 4 November. Gunfire had been the leading cause of loss; of those knocked out by gunfire, typically 53% were repairable. Mines were the second leading cause of tank losses; of those knocked out by mines, however, typically 65% were repairable. For the year of 1942, the 8<sup>th</sup> Army reported a loss of a total of 1123 tanks, of these, 884 were lost to gunfire and 188 to mines. Therefore, over half of the 8<sup>th</sup> Army's tank losses for the year had occurred in the two-week period of the Second Battle of El Alamein.<sup>i</sup>

The 8<sup>th</sup> Army had also lost 111 guns of various types in this battle. Although statistics can be misleading, these clearly indicate that, while General Montgomery never lost the initiative, the battle was hard-fought. The German troops had put up a magnificent defense and retained their soldierly qualities in the face of stronger forces backed by much greater resources both on the ground and in the air. Those Italian formations that were closely engaged fought with spirit, but they were inadequately equipped for a struggle of this sort, and were generally outclassed, the exception being the paratroopers of the 185<sup>th</sup> Folgore Airborne Division.<sup>35</sup>

**TABLE 32. ALLIED PERSONNEL CASUALTIES**

	KIA	WIA	MIA/CAPTURED	TOTAL
Britain	1,360*	5,190*	1,310*	7,860*
Engineers	N/A	N/A	N/A	N/A
Australia	620	1,944	130	2,694
Engineers	1/17	5/86	-	6/103
New Zealand (23 Oct -21 Nov)	380	1,290	41	1,711
Engineers (5.5% of division)	16 (4.2%)	62 (4.8%)	-	78 (4.6%)
South Africa	140*	540*	140*	843
Engineers	N/A	N/A	N/A	46
India	20*	90*	20*	130*
Allied**	70*	270*	70*	410*
8 <sup>th</sup> Army Total	2,350	8,950	2,260	13,560
Engineers	34	153	-	187

\* Estimated quantity

\*\* Includes the Free French, Greeks, Poles, etc.

<sup>i</sup> Author's note: during the battle of Alam Halfa, only 67 Allied tanks were put out of action (including 18 Grants knocked out and 13 damaged), an estimated 40-50 of these were a total loss. See *The Mediterranean and Middle East, Volume IV, The Destruction of the Axis Forces in Africa*, pages 78-79 and "Survey of Allied Tank Casualties in World War II," by Alvin D. Coox and L. Van Loan Naisawald, ORO-T-117, Operations Research Office, The Johns Hopkins University, Fort McNair, Washington, D. C., 31 March 1951, pages 61-62.

### 7.2.2. AXIS

As stated earlier, the *panzerarmee* reported on 3 November that their infantry, *panzerjaeger*, and pioneer units had been reduced to about 50%, the artillery to 40% and the panzers to 24 operational tanks.<sup>36</sup> Casualties included many seasoned leaders the *panzerarmee* could ill afford to lose, such as Knight's Cross holder *Hauptmann* Otto Stiefelmayer, the commander of I Battalion, 8<sup>th</sup> Panzer Regiment, who was killed in combat on 3 November. By 4 November, many of the German formations had been reduced to skeletons and many of the Italian ones had disintegrated. For the next few days, *Generalfeldmarshall* Rommel had little idea of what he had left. On this day, he had only 36 German tanks operational (including some of the light Panzer IIs) out of 276 at the beginning of the battle. The Italians had also lost almost all of their 301 tanks, about half of them (from the *Ariete* Division) being destroyed by the 7<sup>th</sup> Armoured Division on this day. By 5 November, the Allies reported having captured 2,922 Germans and 4,148 Italians. By 11 November, this had risen to 7,802 Germans and 22,071 Italians for a total of about 30,000 men.<sup>37</sup> Also, about 1,000 guns and 450 tanks were left in the El Alamein area.<sup>38</sup> Many of these had only been disabled until one of the Allies roaming patrols of sappers got to it. Between 23 and 28 October, Royal Engineers of the 1<sup>st</sup> Armoured Division, for example, accounted for 35 tanks and 26 guns in this fashion. By 8 November, the "score" of the 8<sup>th</sup> Army engineers was up to 192 tanks and 163 guns.

General Fritz Bayerlein noted that, for the period 23 October to 25 November, "*The casualties of the panzerarmee from the beginning of the Battle of El Alamein up to its arrival at the Mersa el Brega line amounted to: German troops, 1,100 killed, 3,900 wounded and 7,900 prisoners; Italian troops (approximations only, figures cannot be guaranteed), 1,200 killed, 1,600 wounded, and 20,000 prisoners. (figures obtained from Offizieller Bericht des Oberkommandos Afrika.)*"<sup>39</sup> For the period 21 October to 11 November, the 15<sup>th</sup> Panzer Division reported the loss of 92 officers and 1,492 men out of an initial strength of 171 officers and 3,769 men, a 40% loss.

### 7.2.3. NON-COMBATANT CASUALTIES

As a result of the battles around El Alamein, approximately 1,500,000 mines were left in the ground by both sides after the tide of battle swept west to Tunisia. These mines remain a problem to this day, occasionally causing casualties among the nomadic Bedouin and impeding the commercial development of the area.<sup>i</sup> In an attempt to help rectify this problem in some way, the former combatants have provided technical assistance to the Egyptian government, whose combat engineers have resorted to slowly clearing the area using many of the same techniques used by Major Reid's sappers. As part of this report, a database has been prepared of the German minefield records for this battle (several hundred pages) found in the U.S. National Archives. It is hoped that these can be turned over to the Egyptians and help write part of the last chapter of this pivotal battle.<sup>40</sup>

## 7.3. ENGINEER LEADERS

**7.3.1. *Oberst* Hans Hecker's** performance in North Africa had identified him as a rising star in the *Wehrmacht*, a potential division commander. It was highly unusual for an engineer officer to be selected for division command in World War II, even in the pragmatic German Army.<sup>ii</sup> Although there were several requests

<sup>i</sup> The Egyptian government reports that 3,018 military personnel have been injured and 278 killed by unexploded ordnance plus another 4,599 civilians injured and 418 killed by the same cause. However, these statistics must be qualified in several particulars: these figures include casualties from the heavily mined area along the Suez canal (in fact, the majority of casualties are from this region, on ordnance left over from their various wars with Israel). The Egyptian government draws no distinction between mines and other unexploded ordnance, casualties may have been caused by either. There is no time frame associated with these figures, presumably, they are the total recorded numbers. Also, there is no external or independent verification of the figures. Approximately 33,000 hectares (1 hectare equals an area 100m x 100meters) of 278,000 hectares remains to be cleared in the western desert. See "Egypt Country Plan," US CENTCOM, at [www.centcom.mil/demining/egypt-country-plan.htm](http://www.centcom.mil/demining/egypt-country-plan.htm). See also "Egypt Urges Aid Boost to Hunt Desert Mines," by Philip Finnegan, Defense News, November 30-December 6, 1998, *Hidden Killers, The Global Problem with Uncleared Landmines*, Department of State Publication 10098, Office of International Security Operations, Bureau of Political-Military Affairs, US Department of State, 1993, page 84, and *Hidden Killers, The Global Landmine Crisis*, Department of State Publication 10225, Office of International Security and Peacekeeping Operations, Bureau of Political-Military Affairs, US Department of State, 1994, page 20.

<sup>ii</sup> Other examples of engineer general officers commanding maneuver units include *Oberst* Otto Skorzeny who commanded the 150<sup>th</sup> Panzer Brigade during the Battle of the Bulge, *Generalmajor* Karl Lorenz of the elite GrossDeutschland Division, General Lammerding of the 2<sup>nd</sup> SS Panzer Division (Das Reich), and General Karl Ullrich of the 5<sup>th</sup> SS Panzer Division (Wiking). At the higher level, *Generalmajor* Karl Buelowius assumed command of the *Afrika Korps* in February 1943, *Generalleutnant* Alfred Gause, who had served as *Generalfeldmarshall*

for his transfer starting in the summer of 1942, *Generalfeldmarshall* Rommel had held onto his prized senior pioneer as long as possible. On 26 October, at the height of the 2<sup>nd</sup> Battle of El Alamein, another emphatic memorandum arrived from the high command, insisting upon his immediate transfer. On 8 November, *Oberst* Hecker's replacement, *Generalmajor* Karl Beulowius, had arrived. By 25 November, the remains of the *panzerarmee* had withdrawn to the relative safety of the Mersa el Brega position. It was from here, over ten long months before (starting on 21 January), that *Generalfeldmarshall* Rommel had launched the series of successful attacks that lead the *panzerarmee* to disaster at El Alamein.

On 1 December 1942, *Oberst* Hecker finally left Africa, sick with jaundice and dysentery. After recovering in Weimar, he attended the senior commanders' course from 15 June 1943 to 10 July 1943 at the *Panzertruppe Schule* in Wunsdorf. This officially qualified him for division command. In the winter of 1943, *Oberst* Hecker took command of the 20<sup>th</sup> Panzer Division of Army Group Center on the Russian Front until early 1944. With the situation deteriorating in Italy, he assumed command of the 26<sup>th</sup> Panzer Division there, from 30 January 1944 to 2 March 1944. On 27 March, he was given command of the 90<sup>th</sup> Panzer Grenadier Division. This unit was the reincarnation of the famous 90<sup>th</sup> *Leicht Afrika* Division of the *Afrika Korps* and participated in operations around Anzio and Cassino. *Oberst* Hecker commanded this division until 27 April 1944, when he was given command of the 3<sup>rd</sup> Panzergrenadier Division on 28 April, also in Italy. On 1 June 1944, he was promoted to Generalmajor (equivalent to Brigadier General in the US Army). He and the division were soon transferred to France where they fought against the Allied units which had invaded Normandy. He remained in command of the 3<sup>rd</sup> Panzergrenadier Division until 5 October 1944, when he was assigned to the OKH (Oberkommando des Heere) staff. He remained there until the end of the war. He was living in Munden in 1958.<sup>i</sup>

**7.3.2. Major Paolo Caccia-Dominioni de Sillavengo**, the commander of the XXXI *Guastatori* Battalion, was able to extract his battalion along with the 24<sup>th</sup> Engineer Battalion and the 15<sup>th</sup> Company of Defense Engineers from the Italian X Corps position in the southern sector. As the senior officer present, he assumed command on 3 November and began to work his way west and north through the pursuing 8<sup>th</sup> Army. On 6 November, he reached the German rearguard at Mersa Matruh. At this point, his proud battalion had been reduced to 250 scarecrows, but they went on to fight through out the campaign in Tunisia. However, at some point, Major Sillavengo had to be evacuated with a tropical illness. In 1948, he returned to El Alamein and spent 14 years recovering the bodies of the combatants from both sides, to ensure that these men were given a proper burial. In all, his small team recovered the remains of 3,281 men. In 1962, he published an outstanding book on his experiences in North Africa entitled, *Alamein, 1933-1962, An Italian Story*.<sup>41</sup>

**7.3.3. Brigadier Frederick, 'Cecil' Kisch**, the Chief of Royal Engineers for General Montgomery, who had played such a central role in the development of the 8<sup>th</sup> Army's mine breaching capabilities, came to be known in the 8<sup>th</sup> Army as the man who beat the mine. Ironically, he was killed by a German 'S' mine at Wadi Akarit (in

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Rommel's chief of staff, later commanded the II Corps from 14 January 1945 until the end of the war, while *General der Pioniere* Erwin Jaenicke commanded the 17<sup>th</sup> Army in the Kuban Bridgehead in late 1943. US examples include Bruce Clark, commander of the 7<sup>th</sup> Armored Division, (who went on to be Chairman of the Joint Chiefs), General William Hoge, commander of the 4<sup>th</sup> Armored Division, (who went on to command the IX Corps in Korea, 4<sup>th</sup> and 7<sup>th</sup> Armies, and finally, served as CinC, USAREUR), and of course, General of the Armies Douglas MacArthur. British Commonwealth examples include General Percival Hobart, who commanded the 7<sup>th</sup> Armoured Division and later the 79<sup>th</sup> Armoured Division as well as New Zealander Brigadier G. H. Clifton, who was captured by *Panzerarmee Afrika* on 4 September 1942 while in command of the 6<sup>th</sup> New Zealand Brigade. He had been the Chief of Royal Engineer of the 2<sup>nd</sup> New Zealand Division (1940-1941) and the Chief of Royal Engineers of XXX Corps (1941-February 1942). General Giffard le Q. Martel, who commanded the 50<sup>th</sup> Division with the B.E.F. (British Expeditionary Force). General Edwin Morris who commanded the 1<sup>st</sup> Division (1941) and 9<sup>th</sup> Corps (1941 and 1942). General Phillip Neame, who commanded the 4<sup>th</sup> Indian Division (1940). General Francis Nosworthy, who commanded the 18<sup>th</sup> Division (1940) and the 4<sup>th</sup> and 9<sup>th</sup> Corps (1940-1943). General Pakenham Walsh, who commanded the 9<sup>th</sup> Corps (1941), General O. L. Roberts, who commanded the 23<sup>rd</sup> Indian Division (1943-1945) and the 30<sup>th</sup> Corps (1945). And General Ronald Mack Scobie, who commanded the 70<sup>th</sup> Division (1941) and 10<sup>th</sup> Corps (1944-1946).

<sup>i</sup> The information on *Oberst* Hermann Hans Hecker was compiled from three sources, 1) His service record in the US National Archives, Captured German Records Division, RG 242, German Army Officer 201 File, Roll 248, 2) *Die Generale des Heeres*, by Wolf Keilig, Friedberg: Podzun-Pallas-Verlag, 1983, pages 35-36, 3) *Hitler's Legions, The German Army Order of Battle, World War II*, by Samuel W. Mitcham, Stein and Day, New York, pages 351, 376, and 409. Where the information was contradictory, his service record was assumed to be accurate.



Tunisia) on 7 April 1943. Four other men died with him. He had gone forward to organize the repair of a major road bridge over the wadi near Gabes.<sup>i</sup>

**7.3.4. Major Peter Moore**, who led the 3<sup>rd</sup> Field Squadron, 10<sup>th</sup> Armoured Division during the Battle of El Alamein, volunteered for duty as an adviser to Marshal Tito's Yugoslav partisan army. He parachuted into the Balkans in September 1943. On one mission, he organized a mission to destroy a key railroad bridge along the Trieste-Ljubljana railway (in support of the Allied campaign in Italy). The mission required a huge quantity of explosive to be dropped in. As a result of this mission, the bridge was knocked out for a "considerable time" and Major Moore was awarded a bar for his DSO (Distinguished Service Order). After World War II, he served in Palestine (1946-1948) as the Chief of Royal Engineers for the 6<sup>th</sup> Airborne Division during the 'peacekeeping' operations of the last years of the British Mandate. In 1951, he served as the commander of the 28<sup>th</sup> Field Engineer Regiment of the Commonwealth Division during the Korean War, earning the second bar to his DSO. In 1955-1958, he commanded the 28<sup>th</sup> Commonwealth Independent Infantry Brigade Group in Malaya. He was engaged in this notably successful counterinsurgency war against the communist terrorists. He was promoted to brigadier and retired from the military in 1963 as the only sapper ever awarded three DSOs. From 1963 to 1976, he worked for British Ministry of Agriculture. Brigadier Moore died on 23 July 1992 at the age of 81.<sup>42</sup>

**7.3.4. Colonel Frederick Hanson**, the Chief of Royal Engineers for General Freyberg, was eventually promoted to brigadier and became the Chief Engineer of the 2<sup>nd</sup> New Zealand Expeditionary Force. After the war, he became the Commissioner of Works in New Zealand from 1955 to 1961.<sup>43</sup>

**7.3.5. Major Murray Reid**, who had led his company of New Zealand Sappers to one of the few successful breaches on the first night of Operation Lightfoot, was wounded in the arm while forward on a reconnaissance mission with Brigadier Gentry on 16 December near El Agheila. As he was being evacuated to the rear, the ambulance driver mistakenly drove into a column of the withdrawing 15<sup>th</sup> Panzer Division and was captured. As a result of the wound, Major Reid's arm had to be amputated by an Axis doctor. He was liberated by the 8<sup>th</sup> Army at Tripoli on 23 January 1943.<sup>44</sup> Major Reid wrote an outstanding book on his experiences at El Alamein titled, *The Turning Point, With the N. Z. Engineers at El Alamein*.

## **7.4. SUBSEQUENT MINE/COUNTERMINE DEVELOPMENTS<sup>ii</sup>**

### **7.4.1. GERMAN**

Driven by requirements on the Russian Front, the Germans had a relatively robust research and development program in mine warfare prior to the Second Battle of El Alamein. However, experience in this battle undoubtedly gave increased impetus to these efforts, particularly in the areas of blast resistant fuzing, coupled fuzes, and minimum metal mines (and other counter measures to current mine detection methods).<sup>45</sup> Indeed, as Royal Engineer Michael Croll noted, "*The German gift for mechanical engineering was clearly shown in their production of military equipment, and mines were no exception... A combination of necessity, technical ability and a high level of military organization ensured German primacy in mine warfare until 1945, with a legacy that survives to this day.*"<sup>46</sup>

To counter dismantled mine detection methods, the Germans pursued a number of technical options. Indeed, when the *panzerarmee* evacuated Tripoli in January 1943, the 8<sup>th</sup> Army discovered a factory that was producing non-magnetic wooden cased mines (apparently both antitank and antipersonnel mines).<sup>47</sup> Several standard wooden cased mines entered service with the *Wehrmacht* in 1942, including the *Holzmine 42* antitank mine as well as the famous *Schumine 42* antipersonnel mine. Later in the war, the Germans fielded plastic and glass cased

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<sup>i</sup> For an eyewitness account of this incident, see "Seventy Men. A Troop of Sappers with the Eighth Army in Early 1943," by Nitebar, *The Royal Engineers Journal*, Vol. 107 No.1, April 1993, pages 68-69. See also Brigadier Kisch's obituary in *The Royal Engineers Journal*, September 1943, pages 223-224, and *Brigadier Frederick Kisch, Soldier and Zionist*, pages 190-191.

<sup>ii</sup> Author's note: It is impossible or inaccurate in many cases to attribute specific technical developments to certain battles, therefore, this section is a more general overview of trends.



mines that were more resistant to the elements than the wooden mines.<sup>48</sup> By January 1944, the Germans had developed a frequency-induction fuze, the SM-12, which was designed to detonate when an electronic mine detector swept over. This was an improved version of a similar Russian fuze that was captured in December 1943, but found to be unreliable, with an 86% failure rate. Although the Germans had placed these advanced fuzes into production by the end of the war, there is no evidence of any of them being used in combat.<sup>49</sup> To counter manual probing techniques, the Germans introduced an improvised mine (suitable for both antitank and antipersonnel use) made with uncased plastic explosive, such that a sapper probing for a mine was much less likely to feel anything unusual as he prodded the ground. This mine first appeared in Sicily in 1943.<sup>50</sup> As another counter to probing, the Germans fielded their first small, 'toe-popper' mine, the 'A 200' (called the 'mustard pot' by the Allies), which was encountered for the first time by the Americans on D-Day at Omaha Beach. These mines were only 75mm in diameter and were thus much more difficult and time-consuming to locate by probing, about 144 probe insertions per square meter versus 16 per square meter for the Tellermine.<sup>51</sup> As a countermeasure against manual lifting techniques, the German pioneers used increasing numbers of anti-handling devices on their antitank mines and fielded an improved remote control firing system.<sup>52</sup> The Germans also worked to improve the lethality of their antipersonnel mines, fielding the S-Mine 44, which fragmented much more efficiently than the S-Mine 35. The S-Mine 44 had approximately 2000 4mm diameter steel balls as opposed to only 350 9mm steel balls in the S-Mine 35, thus increasing its lethal radius.<sup>53</sup> They also developed a directional antipersonnel mine (a 'trench mine'), that is the forerunner of the US Claymore, by the end of the war. It did not enter production.<sup>54</sup>

To counter the 8<sup>th</sup> Army's new, mounted minefield breaching methods, *Generalfeldmarshall* Rommel's pioneers quickly improvised coupled antitank mines, which could defeat flail and roller equipped vehicles. These first appeared at Halfaya pass during their long retreat west (as described above). The German research and development establishment also developed specialized, coupled antitank mines.<sup>55</sup> As another countermeasure to mine breaching vehicles, the Germans began to improvise side-attack antitank mines from the new, disposable *panzerfaust* antitank rocket, which had been developed in 1941 (contrary to popular belief, this weapon was developed independently of the American Bazooka). Such a device could be aimed at the expected location of the host vehicle when its mine clearing apparatus encountered the fuze.<sup>56</sup> During 1942 and 1943, the Germans began fielding the Tellermine 42 and Tellermine 43 with more blast resistant fuzing compared to the vulnerable Tellermine 35 with its large diameter pressure plate, as a counter to explosive breaching techniques. To increase the probability of encounter (and thus decrease the number of mines (and time) required to emplace a minefield of constant effectiveness), the Germans fielded several full-width attack technologies. These technologies included a tilt-rod fuze (*knickzunder*), an adapter for 'daisy-chaining' Tellermines (*Druckschienen*), and a 'bar' type antitank mine, the *Riegelmine 43*.<sup>57</sup> Even though their Tellermines contained 33% to 100% more explosives than most of their opponents' mines, the Germans continued to work to increase the lethality of their antitank mines. To accomplish this, they developed several full-width attack mines that employed shape charged warheads, such as the *Panzer Stab Mine 43* and the *Hohl-Sprung Mine 4672* (of which 59,000 were produced before the end of the war). These were designed to destroy a tank and kill its crew, rather than just break the track and damage the suspension, thus greatly increasing the psychological impact of antitank mines on armored vehicle crews.<sup>58</sup> The pervasiveness and effectiveness of German mine warfare came as a nasty surprise to the Americans, with General McNair claiming that it represented "almost a new arm of warfare."<sup>59</sup> To assist in the rapid emplacement of mines, the Germans had developed a mine-laying vehicle early in the war, but the device proved impractical. The pioneers of the DAK also improvised mine chutes to assist in them.<sup>i</sup>

Probably more important than any technical lessons were the tactical and operational lessons that Erwin Rommel appears to have learned from this battle.

- 1) That mines used on a massive scale and integrated with other weapons cause an attacker heavy casualties, physically and psychologically.
- 2) Extremely deep mined areas are a significant hindrance to the ability of armored units to maneuver because they confine them to narrow strips, kilometers in length, thus greatly increasing their vulnerability to direct and indirect fire.

<sup>i</sup> *German Mine Warfare Equipment*, page 10. See also "Panzer Group Africa Engineer Officer," page 9. Krupp also experimented with one towed behind a Tiger tank, see a video, "Great Fighting Machines of WWII."

- 3) Widely scattered, randomly emplaced mines are very difficult to counter because of their lack of pattern. Therefore, predictable patterns should be avoided as much as possible. Minimum metal mines are ideally suited for this type of task.<sup>60</sup>
- 4) Antipersonnel mines are an essential part of the mix and had to be present in significant quantities to be effective against dismounted units.
- 5) The ability of his pioneers to improvise solutions to difficult problems from available resources was impressive.

*Generalfeldmarshall Rommel* put these, and other lessons learned, to use when he was called upon to prepare the "Atlantik Wall" for the expected Anglo-American invasion in 1944. *Generalleutnant Fritz Bayerlein* reports, "as a result of his experience in Africa, Rommel believed that large minefields would provide conditions in which the ill-equipped German infantry divisions would be able to take on the U.S. and British forces.

The following extract from a letter written by *Wilhelm Meise*, the Engineer Commander of Army Group B, on 17<sup>th</sup> March 1944, shows the scale of *Rommel's* mine-laying plans.

"... For the first stage, that is a thousand-yard strip along the coast and a similar strip along the land front, 10 mines a yard will be required, making a total for the whole of France of 20,000,000 mines. For the remainder of the zone (8,000 yards) France will require in all some, 200,000,000 mines..."<sup>61</sup> This would enable him to establish a mined zone almost 10 kilometers deep along the coast. Mines required little effort to put down and could be laid to produce operational results. A handful of determined and skilled pioneers with a truckload of mines could halt an entire armored division or channel its vehicles into predetermined killing zones. The depth of the mined areas and the great amount of time and labor required to clear them, made the armored forces behind the sappers very vulnerable. *Generalfeldmarshall Rommel's* defensive scheme for the "Atlantik Wall" was clearly influenced by his experience with the "Devil's Gardens" of El Alamein.<sup>62</sup>

*Generalfeldmarshall Rommel's* estimate of the effectiveness of his "Devil's Gardens" is in direct conflict with other German officers, notably General Graf Theodor von Sponeck, Field Marshal Albert Kesselring and General Alfred Toppe. General von Sponeck wrote that, "They had... overestimated the minefields. Rommel built upon them that the point of the enemy's attack would be immobilized after the penetration of the minefields; there enduring heavy losses. This mislead them to the belief that the enemy could be destroyed through piecemeal attacks... The casualties caused by mines were widely overrated. One estimate for example, gave 30 out of a loss of about 400 enemy tanks, whereas British sources state the loss of 100 tanks."<sup>63</sup> Field Kesselring wrote, "the so-called "Devil's Gardens"- mined areas laid out on a certain plan-did not live up to the promises made for them."<sup>64</sup> General Toppe, a logistician who did not participate in the battle, wrote that the mine gardens "did not have the desired effect because many of the mines had been detonated by the artillery fire or during bombing attacks."<sup>65</sup> It should be pointed out that none of these officers was closely involved with the tactical fighting at El Alamein. The opinion of *Generalfeldmarshall Rommel* (and most other line officers) was that *General der Kavallerie Stumme* was at fault for not using his limited army level artillery assets to cover the minefields with fire when the battle began. For example, General Walter Nehring noted that, "The "mine box system" had proven once more that the employment of mines alone is not enough, that the attacker can breach them with little loss of time. At most, Rommel's system, covered by strong artillery fire onto the boxes penetrated by the enemy is able to destroy them. But this was not the case in the Alamein position for known reasons. Another disadvantage was the hindrance of our own counterattacks through the large minefields, as actually happened to the 21<sup>st</sup> Panzer Division on 27 October."<sup>66</sup>

Around this point in the war, countermine developments were of less immediate concern to the Germans given their loss of the strategic initiative following the destruction of General von Paulus' 6<sup>th</sup> Army at Stalingrad in January 1943, and later, the failure of Operation Citadel to regain it at the Battle of Kursk in July 1943. However, the Germans did undertake the development of their own version of the mine-clearing flail (*Minenraeumgeraet Dreschflegel*) for the Panther tank, albeit at a rather leisurely pace. The first prototype entered testing in January 1945.<sup>67</sup> A prototype mine roller was also developed for the Panzer IV as well as a couple of mine resistant vehicles.<sup>68</sup> Nevertheless, the Germans placed their primary effort in countermine in the continued development of remote controlled demolition vehicles and metallic mine detectors. Indeed, the remote control vehicles were tested in North Africa in August 1942 and found to be 'unsuitable,' leaving *Generalfeldmarshall Rommel's* pioneers to manually breach the extensive Allied minefields during the battle of Alam Halfa.<sup>69</sup>



#### 7.4.2. ALLIED

Although the Second Battle of El Alamein had little direct influence on the development of Allied mine warfare (British and American mine warfare doctrine and equipment would remain largely unchanged to the end of the war), there was one interesting lesson learned which stated that the British should develop a new mine that “*self-destroying after a certain period to avoid the need for lifting*.” Unfortunately, this comment was ignored for 30 years.<sup>70</sup> However, as a result of the campaign in North Africa and the “Blitz” against England, the US Army did pursue making a copy of the German SD-2 “Butterfly” bomb and scatterable antipersonnel mine, standardizing both the munition (M83) and cluster by the end of 1943. However, their results were less than satisfactory. As a result of quality control problems with its fuze, which continued into 1945, the M83 would not see action until the Korean War<sup>71</sup>

Nevertheless, this battle had critical implications for the development of breaching equipment and organization, particularly for the more astute Royal Engineers.<sup>1</sup> The training and rehearsals conducted before the attack were certainly the most successful portion of the 8<sup>th</sup> Army’s countermine effort. As Major Reid of the Royal New Zealand Engineers noted that the 8<sup>th</sup> Army’s Mine Warfare School “*did a great job and was largely responsible for our success in breaching the enemy’s minefields at El Alamein*.”<sup>72</sup> Lieutenant-Colonel McMeekan, Chief of Royal Engineers for the 10<sup>th</sup> Armoured Division remarked, “*I felt that every possible preparation had been made. Some of our equipment... had only arrived three days before. But we had almost everything we needed—men, tools, transport—and this feeling of being adequately equipped for the task is very rare in war*.”<sup>73</sup> The recovery of damaged pilot vehicles from the minefields provided some difficulties.<sup>74</sup> Efforts were also made to improve on the electronic mine detectors, mostly by increasing their sensitivity and making them more rugged.

General Gatehouse, Commander of the 10<sup>th</sup> Armoured Division in a special Order of the Day, on 27 October, had high praise for the men of his minefield task force. “*I particularly wish to commend the very gallant and efficient work of the Royal Engineer, the Royal Signal Corps, and the Corps of Military Police. These troops lead the advance of their Division under shell fire and small arms fire, and in my opinion the mines were lifted, communications were established and the routes were marked with the same precision and efficiency as in our training schemes in the rear areas*.”<sup>75</sup>

Of the various items of countermine equipment that were used, the mine detectors and the Scorpions, in particular, were considered to be qualified successes by many participants.<sup>76</sup> The regimental history of the 44<sup>th</sup> Battalion, Royal Tank Regiment noted that the Scorpions had, “*a very difficult time, for this was a new weapon which had not been thoroughly tested. It was found that the tanks overheated so badly that the petrol vaporised after a run of only two hundred yards (about 180 meters), and most minefields were deeper than this. Another*

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<sup>1</sup> US WWII mine tactics, using row mining techniques copied from the British, were established by Antitank Mine Fields, TC (Training Circular) No. 29, War Department, Washington, D. C., 14 May 1942. These tactics remained basically unchanged with the publication of Land Mines and Boobytraps, FM 5-31, War Department, Washington, D. C., 1 November 1943 and its 18 changes. Most of the 18 revisions dealt with breaching operations and new technical data on threat mines, although some elaboration on mine-laying was included on the subjects of organizing minefield supply points (Change No. 13, 10 February 1945) and organization of the mine-laying parties (Change No. 17, 23 June 1945). The only new mines to enter US Army service after the Second Battle of El Alamein were the M6 (the design of which was heavily influenced by the German Tellermines, it is the forerunner of the current US M15 AT mine) and the M7. Very little guidance on obstacle integration with the maneuver plan was provided, the subject being largely left to the discretion of the American division and corps commanders. It should be noted that the standard pattern minefield did not enter US doctrine until the publication of Employment of Land Mines, FM 20-32, Department of the Army, Washington, D. C., 19 July 1955, after the Korean War. In the area of breaching, US tactics (established by Passage of Mine Fields, TC No. 14, War Department, Washington, D. C., 13 February 1943) were directly influenced by the British experience of El Alamein and are a very close copy of the 8<sup>th</sup> Army’s standard minefield breaching drill. These tactics are still evident in the dismounted breaching doctrine in the current version of FM 5-34, Engineer Field Data, 14 September 1987. Given the German propensity for mine warfare, US breaching and route clearance techniques continued to evolve throughout the war as new equipment reached the troops (see FM 5-31 and changes 3, 11, 13, 14, and particularly 16). However, it should be pointed out that specialized breaching equipment (such as flail tanks, demolition snakes, and roller tanks) remained scarce or were technically flawed. This combined, with the typically more fluid nature (although operations at Anzio, Omaha Beach, and against the Siegfried Line are interesting exceptions) of the future campaigns, meant that the US conducted very few deliberate breaching operations. As a result, most countermine work done by US engineers would be done with probes and detectors. Although US route sweeping tactics reached a very high state of development during the Vietnam War (see FM 20-32 (1976 edition), interestingly, these were left out of subsequent versions of FM 20-32 and largely forgotten until Somalia), it should be pointed out that the US Army did not develop a coordinated, combined arms approach to breaching operations until the publication of FM 90-13-1, Combined Arms Breaching Operations for Operation Desert Storm in 1991.

difficulty experienced was with the air filters, which were inadequate to deal with the dust thrown up by the flails until replaced by Crusader (Tank)-type filters. Modifications and training were carried on up to the time that they went into action and even then, as they broke down in the minefields, they were repaired and worked on under fire. Although they were not wholly successful they did a lot of good work and proved the worth of this type of mine clearance when the teething troubles had been overcome. The detachment was fortunate in incurring only a few casualties, Sgt. Holloway being killed in action and Lance Corporal Merrit wounded.” Both of these occurred on the first night of Operation Lightfoot (23/24 October).<sup>77</sup>

Historian David Fletcher described subsequent developments of the Scorpion in North Africa, “Modest as it was, the success of a few Matilda Scorpion Flail tanks at El Alamein had not been forgotten. Indeed, it tended to be magnified as time went by, so when consideration was being given to a formal attack on the Mareth Line (in March 1943) they were included in the battle plan. The intervening months had been devoted to consideration of the requirements for such tanks and the formation of No. 1 Scorpion Regiment and two independent squadrons to operate them. The first need to be identified was greater speed-not during flailing, that would only lead to mines being missed by the flails or detonated as the tank passed over them-rather, it was essential that they should move faster between minefields, to offset the paucity of numbers. Middle East Command had asked for permission to convert 500 tanks, but the most that the War Office would sanction was 300 and it is unlikely that even this number actually appeared. A Scorpion Mark III was therefore developed, based on the Grant tank. It had the same flail rotor. Lattice girder jib and Ford V8 engine as the Matilda version but was of lighter construction and with an improved drive train. The flail operator was located inside the hull, but since the attachments masked the 75-mm gun, this was taken out. Indeed the first Grant Scorpions also had their 37-mm turrets removed, presumably to save weight,<sup>i</sup> and the aperture plated over with a panel that incorporated an escape hatch and a small, box-shaped observation turret.

C Squadron collected their Grants from Tripoli in March 1943, yet it was A Squadron, still in Matildas, which took part in the Mareth battle on 20 March, with only moderate success. In addition to flails the regiment had some Valentines equipped with anti-mine rollers which, being less prone to wear, were used initially to determine the limits of the minefield. They also had some porcupine-type spiked concrete rollers that were trailed behind the tanks to deal with anti-personnel S-mines (or Schuh-Minen).... A Squadron got their Grants early in April, although again it was B Squadron, who still had Matildas, which was called up for action at Wadi Akarit on 5 April.

On 18 April it was announced that six Grant turrets had arrived for fitting, so it clearly had now been decided to give the tanks some teeth, even if it was only a 37-mm gun and coaxial Browning. Bearing in mind that the end of a successful flailing run placed them on the wrong side of an enemy minefield, ahead of everyone else, it does not appear unreasonable that they should have needed something to shoot with. On 19 April A Squadron took Grant Scorpions into action for the first time, presumably in their turretless form, since there would have been no time to fit them.... Meanwhile back in Egypt 400 and 401 Independent Scorpion Squadrons were engaged in various experiments...

It is worth remarking that all the design and production work for this device was undertaken by REME base workshops in North Africa.”<sup>78</sup>

General Freyberg, Commander of the 2<sup>nd</sup> New Zealand Division wrote, “A properly developed and constructed “Scorpion” (tank with flails) seems to offer the best solution to the negotiation of mined areas. The “Scorpion” must flail the ground for a width of at least 18 feet and the flails must be operated by a heavy duty engine which will not be stopped by dust, and which will, if necessary, give continuous operation of flails for 8,000 to 10,000 yards with the machine moving at normal tank speeds. The Ford V8 engine was a failure. It is not essential, but it is desirable, that the flail engine should be operated from within the tank itself. “Scorpion” guiding or steering methods should be devised which do not involve men walking unprotected in the open.”<sup>79</sup>

However, the Scorpions were not popular with everyone. Around Christmas time in 1942, the New Zealanders of the 8<sup>th</sup> Field Company, now under the command of a Major Pemberton, were assigned the mission of clearing the dispersal area of the Nofilia airfield. “Major Pemberton was not impressed by the amount of work done by the RE party with its four Scorpions and fifty-odd crew. The ‘Scorps’ were Mark II models and supposed to be

<sup>i</sup> However, this significantly altered the vehicle’s center of gravity. A concrete counterweight had to be placed on the rear of the vehicle to restore its balance. “Notes on the Scorpion, A Minefield Clearing Device,” page 34.



improvements on those used at Alamein, but to Pemberton's jaundiced eye, instead of improvements, more disabilities had been thought up.

In a report to the CRE he said that in one and a half days' work an area 200 by 70 yards had been proved and one mine found; a sapper party with three detectors would be expected to cover the same ground in four to five hours. He reported on the machines very fully and in very correct technical terms, and then, excusing the men for the poor showing, he ended on a more forthright and colloquial note: 'This very bad for the morale of the operators. (They know the damn things are no bloody good.)'<sup>80</sup>

As a result of the difficulties encountered by the sappers trying to fill road craters protected by "S" mines during the pursuit of the retreating *panzerarmee* in November 1942, Brigadier Kisch wrote, "*Bulldozer operators understand that they are being exposed to a certain risk in order to avoid endangering many more men if other methods were used. For this task a lightly armoured bulldozer is badly needed.*"<sup>81</sup>

Based on British experience, the American 1<sup>st</sup> Armored Division established the 6617<sup>th</sup> Mine Clearing Company while they were in North Africa. This company, formed from the 16<sup>th</sup> Armored Engineer Battalion, was eventually equipped with 12 'T-3' Scorpion flails mounted on M4A4 Sherman tanks as well as other mine clearing equipment. The 6617<sup>th</sup> Engineer Company eventually saw action at Anzio and in the invasion of southern France. Later, the US Army converted the 738<sup>th</sup> and 739<sup>th</sup> Tank Battalions into 'mine exploder units' in September 1944 for use in France. Each of these was authorized 18 T1E1 and 24 T1E3 mine roller tanks, 12 Sherman tankdozers and 18 M4A3 gun tanks, because of various technical shortcomings in the Ordnance Corps developed rollers, these large mine rollers were not successful in combat.<sup>82</sup> It should be pointed out that, at least this time, the Americans had the foresight to equip their combat engineers, who had to endure the same threats as the tankers, with the same first line combat tanks. Although the North African campaign was largely responsible for the establishment of a massive research and development effort in the U.S. to counter mines, very little of this new equipment ever reached the troops in the field in any quantity. The most noteworthy new items to reach the troops include the tankdozer (the only new breaching item which could be fairly judged a success), the mine clearing rollers (described above), the Demolition Snake (from the Canadians, used successfully by the 1<sup>st</sup> US Armored Division during the breakout from Anzio in May 1944, but generally too cumbersome to be employed in most situations), and the AN/VRS-1 jeep mounted mine detector (which did not improve route sweep performance because it could be driven no faster than a dismounted sapper could sweep a road if it was to be stopped before it ran over a mine that it had just discovered). None of these new items ever became standard issue to the engineer combat battalions, leaving the American combat engineer to make do with mine detectors, bayonets, and Bangalore torpedoes in his advance across northern France.<sup>83</sup>

The Royal Engineers, on the other hand, carefully considered their experiences at the Second Battle of El Alamein and the failed raid on Dieppe (19 August 1942). They continued to vigorously press the development of special purpose armored engineer vehicles as well as the organizations that could use them most effectively. It was apparent from their combat experiences, which although every soldier had to be able to emplace and breach landmines, special units, focused on the problems of mobility were essential if the knowledge and experience in combined arms breaching was to be retained, analyzed and utilized. This trend ultimately culminated in the development of General Percival Hobart's famous 79<sup>th</sup> Armoured Division ('Hobart's Funnies'). If the Germans were the leaders in mine warfare, then, certainly the British became the leaders in breaching operations.<sup>84</sup> Their famous 79<sup>th</sup> Armoured Division was probably the most advanced combat engineer organization ever put in the field by any country. This unit had capabilities that the US Army does not have to this day. The development of the 79<sup>th</sup> Armoured Division was strongly encouraged and supported by General Montgomery as he prepared to assault through *Generalfeldmarshall* Rommel's defenses again, this time the Atlantic Wall in Normandy. General Montgomery was determined to be better prepared for the tricks of the Desert Fox' pioneers on D-Day than he had been at El Alamein. It should be noted, that some historians attribute the disparity between British and American casualties on D-Day to the decision by General Omar Bradley to use primarily dismounted engineers to breach the beach obstacles, while the 'funnies' of the 79<sup>th</sup> Armoured Division were able to execute a mounted breach of the Atlantic Wall.<sup>i</sup>

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<sup>i</sup> The Story of the 79<sup>th</sup> Armoured Division, October 1942 – June 1945, unit history, Germany, July 1945. *Vanguard of Victory, The 79<sup>th</sup> Armoured Division*, by David Fletcher, HMSO, 1984. And *79<sup>th</sup> Armoured Division, Hobo's Funnies*, by Nigel Duncan, Profile Publications,



## 7.5. OTHER ALLIED COMBAT ENGINEERING LESSONS LEARNED<sup>1</sup>

A US Observer reported the following engineering lessons learned for the campaign in North Africa:

### a. Equipment

#### (1) Minefield-Clearing Devices

*The development of "Scorpions" and their employment under engineer control has been encouraging... In addition, some progress has been made in the use of roller-equipped pilot vehicles to locate minefields. The need for such equipment has been clearly demonstrated, even when the limitations of "one mine-one roller" are accepted.*

*The filling of road craters by hand was rendered very hazardous by the presence of many antipersonnel mines, hidden in the sides of the craters and very difficult to locate with detectors. Bulldozers provide the most efficient method of filling craters, but the drivers need light armored protection. The method of pulling out Tellermines by means of attached signal cable, 50-100 yards in length, has been found a valuable means of saving time and minimizing casualties.*

#### (2) Mine Detectors

*Detectors have been shown to be essential equipment and, with adequate replacements, must be available in sufficient quantities. Shortage of detectors involves the loss of time and of valuable lives. The types now in use have not been completely ineffective against the wooden box mine since its metal igniter is usually detected to a depth of about 7 inches. The antitank mine buried 2 or 3 feet deep, is a problem which has not yet been solved.*

*Further development of a "pram" type detector, capable of rapid exploration of roads and shoulders, is clearly advisable.*

#### (3) Road machinery

*North African operations emphasized the enormous value of mechanical equipment in the forward areas. The importance of the bulldozer in division and corps engineer units was brilliantly demonstrated. The bulldozer is often the answer to getting armored vehicles across physical obstacles, which would otherwise impose long delays and necessitate wide detours. Many hours were saved by the invaluable assistance of this item of equipment both in filling road craters and in preparing detours around major demolitions. The amount of mechanical equipment available governs the rate of progress of an army whose advance is limited to the road.*

*It has not been possible to use the available mechanical equipment to full capacity because of lack of transportation. Sufficient means must be provided to make every bulldozer mobile. At present the tank transporter is the only satisfactory means of conveyance for mechanical equipment. In the hasty construction of landing fields, the value of mobile parties with such equipment as graders, scrapers, rollers, and bulldozers was amply demonstrated.*

#### (4) Box Girders (Bridging)

*In the Eighth Army advance from Benghazi to Tripoli, the comparatively small usage of the SBG (small box girder—bridge) equipment was due to the construction of heavy traffic detours which, in the absence of severe rain, accommodated the whole flow of traffic. There were several cases, however, in which SBG equipment was used to carry the main flow of traffic pending improvement of steep detours. The use of earth-moving equipment to fill in dry gaps, or to fill over culverts, greatly reduced the demand for bridging equipment.*

#### (5) Signs

*The liberal provision of previously prepared standardized signs indicating minefields detours, booby-trapped areas, safe routes, and bivouac areas has been shown to be a necessity.*

#### (6) Radiotelephony

*In the Eighth Army advance, an essential need for communication by radiotelephony between the leading Royal Engineer detachments and company or squadron headquarters was clearly demonstrated. Similar communication between the unit headquarters and the CRE (Commander, Royal Engineers) of the leading division was also found to be absolutely necessary for the control and regulation of priorities of traffic on a single congested road. Without*

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Berks, England, 1972. The key problem seems to be how to maintain this expertise in peacetime. It should be possible to establish and maintain such a "special" demonstration unit under the auspices of the engineer school.

<sup>1</sup> Question 14: Is a copy of the 8<sup>th</sup> Army after action report, titled "lessons from Operations, October and November 1942" available?

this, essential movements of engineer equipment may be blocked, and the whole advance held up while the necessary equipment is worked forward to overcome an obstacle which has proved to be impassable to vehicles.<sup>i</sup>

- a. Airfields (omitted)
- b. Water supply (omitted)
- c. Personnel

An outstanding lesson regarding personnel learned by the Eighth Army was that, in an advance over great distances in the face of a thorough and ingenious enemy, an army must be provided with a liberal allotment of engineer units. Well executed demolitions; the sowing of roads, tracks, and landing grounds with antitank mines, antipersonnel mines, and booby traps; the destruction and contamination of water sources—all these enemy activities call for immediate action by engineers. In addition, the maintenance of long supply lines, the repair of pipe lines, further clearing and wiring of minefields, the temporary repairs of ports and installations, and the development of lines of communication and water sources—all make heavy demands on engineer units. In the Middle East, a shortage of engineer field companies proved a great handicap, and the strain on all personnel employed in minefield clearing was particularly heavy.

The need for more officers per unit was evident. The proportion of casualties from El Alamein to Tripoli throughout all engineer units if the Eighth Army was one officer to ten other ranks (enlisted men). Since the ratio of officers to other ranks in the War Establishment (U.S. Tables of Organization) is one to fifty, it is obvious that the casualties among officers were disproportionately high.

e. Minefield Defense

A British report on operations in the Western Desert, antedating the campaigns referred to above, places emphasis on the following lessons in minefield defense:

Minefields that are not covered by fire and properly patrolled will only cause the enemy slight inconvenience and delay.

Troops that have been allotted the task of holding a mined locality must prevent the enemy from breaking the minefield by every means within their power and whatever the cost. Fire plans must be prepared and action taken accordingly.

The antipersonnel mine is a nuisance to the enemy and a warning device for friendly troops. An antipersonnel minefield does not constitute an impenetrable obstacle. The enemy will always be prepared to accept casualties to get through it.

All possible steps must always be taken to avoid disclosing the location of lanes through minefields. Special steps must be taken to cover those that cannot be kept concealed. Absolutely foolproof arrangements for closing all lanes in the event of attack are essential. Dummy lanes can be used to deceive and ambush the enemy.

There must be enough lanes to enable friendly troops to move out without undue difficulty. A 1-foot exit on each company front and a one-vehicle exit on each battalion front are the minimum.

The existence of minefields must never be allowed to induce a false sense of security. The commanders must take frequent action to make certain this does not happen. The deeper the minefield, the greater the need for forward patrolling. Minefields can be used to economize in antitank weapons but not in infantry.

The principle of concentration at the decisive point applies to the allotment of mines and the laying of minefields as much as to every other aspect of war. Small dispersed minefields are useless.

The use of dummy minefields offers considerable scope for deceiving the enemy.<sup>85</sup>

Another US observer reported, "By American standard the amount of engineer equipment is astonishingly small. Corps and even Army engineer sections will argue and labor over an individual bulldozer or several dump trucks. The equipment in general appeared pretty well worn out as a result of hard service... Much more road machinery was needed, the rate of advance being largely regulated by its availability."

On the subject of mine warfare, this same observer noted, "Despite great experience and extensive practice, the Army was still suffering serious casualties from mines... The problem would appear to be to give all personnel great confidence in avoiding mines; to impress them with the seriousness of the menace; but, by all means, to avoid unduly frightening them. The problem is admittedly very difficult and is at present a very live issue."

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<sup>i</sup> Major Moore, Commander of the 3<sup>rd</sup> Field Squadron noted, "Above all, we had needed a better communications system than one major on his feet. Whilst I had been able to control my Sappers without difficulty, arrangements for reporting back, calling for support and calling up the army had left much to be desired," from "Mine Clearance-El Alamein," page 198.

*In an effort to eliminate the “bogey” of the “S” mine, the Eighth Army Mine School was giving a lecture and a practical exercise on “Eluding the ‘S’ Mine.”*

*The infantry, with the exception of the New Zealand Division, was admittedly jumpy about antipersonnel mines... There were two schools of thought about the use of engineers and infantry in crossing a minefield. Some units, notably the Australians and New Zealanders, sent the infantry straight through the fields. In other units, engineers habitually preceded the infantry...*

*Experience has indicated that a long advance rapidly expends engineers. No way has been found to clear a road and berms rapidly and completely in time to avoid loss of contact...*

*Very few casualties resulted from actually picking up mines; they were generally caused by a man leaving the road or gap to urinate or for some other purpose. A peculiar aspect of the problem is that some men appear to get the idea that “time cures all,” and they will walk into a plainly marked but uncleared field after bivouacking adjacent to it for several days. Many casualties have occurred as a result of this thoughtlessness...*

*Experience has indicated that a 16-yard gap is highly desirable because of the likelihood of a stranded vehicle blocking a narrower gap. At Alamein a minefield-clearing task force, under infantry command, was assigned the job of clearing three lanes through the field, as well as marking those lanes and getting divisional traffic through them. The engineers insisted that this force should be under command of the infantry commander in order that the engineers could concentrate all of their efforts on mines. The organization was elaborate, the operation carefully rehearsed, and the force functioned with marked success.*

*Highly trained men can detect many mines by eye. In one grassy airdrome, 400 were located in this manner. The Indians notably did not like detectors and relied on their eyes and probes. The same thing was true of the Australians and New Zealanders. When airfields are not plowed, it is relatively easy to detect mines by eye and by prodding. Footprints are frequently a giveaway in craters. If engineers can get on the site within 2 days and before a rain, their job is made much easier. It is estimated that 70 percent of all mines can be located by eye. Detection in the desert is much easier than in terrain containing vegetation. Methodical and complete coverage by prodding is very slow—generally not faster than 100 yards an hour per man, and that for only a 1-yard width...<sup>i</sup>*

*It would appear to be impossible to clear all roads and trails completely within any reasonable time. Trucks are being blown up on berms of roads and men killed by antipersonnel mines many days after the road has been “deloused” and declared open by the engineers. Sandbags placed on the floor of a car or truck under the driver and passenger give material protection against mines...*

*The Eighth Army believes that both metallic and non-metallic detectors must be developed that can be used from a closed armored vehicle, and also that some modification of the “pram” detector must be developed which will permit it to be used from a vehicle moving at a reasonable speed for the purpose of searching road shoulders. It is considered that a field company (270 men) requires 48 detectors, but only 16 per company have been available...*

*All troops must be trained in all aspects of mine warfare, including the passage of antipersonnel minefields. The infantry must advance rapidly and be resolutely prepared to take mine casualties, just as they do with artillery and small arms fire.*

*There is continual and intimate contact between the Engineer Section and the “G” (General Staff) Branch, which is responsible for operations, intelligence, and coordination in general. Much greater use is made of the Engineers as technical combat advisers than is common in the U.S. Army, where the tendency is frequently to overstress the service aspect of engineers<sup>ii</sup>*

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<sup>i</sup> In the 8<sup>th</sup> Army pamphlet, “Lessons from Operations October and November 1942,” it was stated that “under operational conditions” one section or troop of Royal Engineers could clear a 16-yard wide gap to a depth of 400 yards in two hours. Although this is obviously only a very rough estimate, it does show that the times allowed in “Lightfoot” were not enough. *The Mediterranean and Middle East, Volume IV, The Destruction of the Axis Forces in Africa*, page 39, note 2. Question 14: Is the 8<sup>th</sup> Army After Action Report, “Lessons from Operations October and November 1942,” available?

<sup>ii</sup> “Engineer Notes on the British Eighth Army,” pages 25-33. This still seems to be a problem for the US Army Corps of Engineers. One British Royal Engineer remarked during Operation Desert Shield, “*The problem with you Yank engineers is that you think like a bunch of bloody ditch diggers and not sappers. No self-respecting sapper would ever work for the bloody G-4.*” See “After Action Report, Operation Restore Hope,” by William Schneek, Belvoir Research, Development, & Engineering Center, Fort Belvoir, Virginia, 13 June 1994, pages H-1 and H-2.



## CHAPTER ENDNOTES

- <sup>1</sup> Der Global Krieg, Die Ausweitung zum Weltkrieg und der Wechsel der Initiative, 1941-1943, Das deutsche Reich and der Zweite Weltkrieg, Bd.4, by Horst Boog, Werner Rahn, Reinhard Stumpf, Bernd Wegner, Militärgeschichtliches Forschungsamt, Deutsche Verlags-Anstalt, Stuttgart, 1990, page 706.
- <sup>2</sup> Kriegstagebuch, 90<sup>th</sup> Leicht Afrika Division, appendix 161.
- <sup>3</sup> War in the Desert, South African Forces, World War II, Volume III, page 452.
- <sup>4</sup> Erinnerungen, page 177.
- <sup>5</sup> US National Archives, Captured German Records Division, Series T-313, Roll 471, frame 8770058.
- <sup>6</sup> History of the Corps of Royal Engineers, Volume VIII, by R. P. Pakenham-Walsh, The Institution of Royal Engineers, Chatham, 1958, page 397.
- <sup>7</sup> "Mine Clearance of Roads by the Eighth Army," Military Report of the United Nations, No. 7, 15 June 1943, pages 40-41, and Brigadier Frederick Kisch Soldier and Zionist, page 175.
- <sup>8</sup> Foxes of the Desert, page 310, With Rommel in the Desert, by Heinz Werner Schmidt, George G. Harrap & Co. Ltd., London, 1951, page 179, New Zealand Engineers, Middle East, page 371, and Alam Halfa and Alamein, pages 458-459.
- <sup>9</sup> Panzerarmee Afrika Tagesmeldung 9.11.42.
- <sup>10</sup> Panzerarmee Afrika Tagesmeldung 9.11.42.
- <sup>11</sup> The New Zealand Division in Egypt and Libya, Operations "Lightfoot" and "Supercharge", page 22.
- <sup>12</sup> New Zealand Engineers, Middle East, pages 372-373.
- <sup>13</sup> With Rommel in the Desert, pages 185-187.
- <sup>14</sup> Foxes of the Desert, pages 303-304.
- <sup>15</sup> New Zealand Engineers, Middle East, page 373.
- <sup>16</sup> Foxes of the Desert, pages 303-304.
- <sup>17</sup> Foxes of the Desert, pages 303-304.
- <sup>18</sup> The Rommel Papers, page 353.
- <sup>19</sup> Brigadier Frederick Kisch Soldier and Zionist, pages 160 and 175-176.
- <sup>20</sup> "Mine Clearance of Roads by the Eighth Army," page 40.
- <sup>21</sup> Brigadier Frederick Kisch Soldier and Zionist, page 177.
- <sup>22</sup> "Command Techniques Employed by Field Marshal Rommel in Africa," page 23.
- <sup>23</sup> The Rommel Papers, page 350.
- <sup>24</sup> "Notes on the Scorpion, A Minefield Clearance Device," Military Reports on the United Nations, No. 6, Military Intelligence Service, War Department, Washington, D. C., 15 May 1943, page 33.
- <sup>25</sup> "Mine Clearance of Roads by the Eighth Army," pages 39-40.
- <sup>26</sup> The Black Watch and the King's Enemies, by Fergusson, Collins, London, 1950, pages 138-142.
- <sup>27</sup> "Mine Clearance of Roads by the Eighth Army," page 40.
- <sup>28</sup> Brigadier Frederick Kisch Soldier and Zionist, pages 178-179, and Taming the Landmine, page 27.
- <sup>29</sup> "Mine Clearance of Roads by the Eighth Army," pages 39-40.
- <sup>30</sup> The Crucible of War, Year of Alamein, 1942, page 452.
- <sup>31</sup> Brigadier Frederick Kisch Soldier and Zionist, pages 160-161.
- <sup>32</sup> Brigadier Frederick Kisch Soldier and Zionist, page 173.
- <sup>33</sup> Die 5. (lei.)21. Panzer Division in Nordafrika, 1941-1943, page 305, and US National Archives, Captured German Records Division, Series T-315, Roll 768, frame 995.
- <sup>34</sup> Das Deutsche Afrika-Korps, Sieg und Niederlage, pages 158-159.
- <sup>35</sup> The Mediterranean and Middle East, Volume IV, The Destruction of the Axis Forces in Africa, page 78.
- <sup>36</sup> Der Global Krieg, Die Ausweitung zum Weltkrieg und der Wechsel der Initiative, 1941-1943, Das deutsche Reich and der Zweite Weltkrieg, Bd.4, page 706.
- <sup>37</sup> The Mediterranean and Middle East, Volume IV, The Destruction of the Axis Forces in Africa, pages 78-79.
- <sup>38</sup> Tobruk and El Alamein, page 742.
- <sup>39</sup> The Rommel Papers, page 358.
- <sup>40</sup> "Historical Minefield Database (El Alamein)," CD-ROM, prepared by William Schneck (Night Vision and Electronic Sensors Directorate) and Fred Clodfelter (BRTRC), and US National Archives, Captured German Records Division, Series T-313, primarily Roll 432.
- <sup>41</sup> Alamein, 1933-1962, An Italian Story, pages 248, 251-282.
- <sup>42</sup> "Memoirs, Brigadier P. N. M. Moore DSO\*\* MC," pages 279-281.
- <sup>43</sup> New Zealand Engineers, Middle East, page 18.
- <sup>44</sup> New Zealand Engineers, Middle East, pages 222 and 379.
- <sup>45</sup> Deutsche Landminen, 1935-1945, by Wolfgang Fleischer, Waffen-Arsensal, Band 164, Podzun-Pallas-Verlag, 1997.

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- <sup>46</sup> The History of Landmines, pages 42 and 52.
- <sup>47</sup> New Zealand Engineers, Middle East, page 422.
- <sup>48</sup> German Mine Warfare Equipment, pages 94-107, 109, and 134-145.
- <sup>49</sup> German Mine Warfare Equipment, pages 67-70, and Soviet Mine Warfare Equipment, TM 5-223A, Department of the Army, August 1951, pages 45-47.
- <sup>50</sup> German Mine Warfare Equipment, pages 156-157, and Italy, 1943-1944, Appendixes, Landmine and Countermine Warfare, Engineer Agency for Resources Inventories, Washington, D. C., June 1972, page L-17.
- <sup>51</sup> German Mine Warfare Equipment, pages 131-134.
- <sup>52</sup> German Mine Warfare Equipment, pages 158-167 and 216-221.
- <sup>53</sup> German Mine Warfare Equipment, pages 123-128.
- <sup>54</sup> Claymore Mines, Their History and Development, by Larry Grupp, Paladin Press, Boulder, Colorado, 1993, page 29.
- <sup>55</sup> German Mine Warfare Equipment, pages 89-92.
- <sup>56</sup> German Mine Warfare Equipment, pages 113-116, and Claymore Mines, Their History and Development, pages 28-29.
- <sup>57</sup> German Mine Warfare Equipment, pages 18-22 and 85-89. See also Deutsche Landminen, 1935-1945, page 27.
- <sup>58</sup> German Mine Warfare Equipment, pages 89-94, 109-110, and 118-122. See also Deutsche Landminen, 1935-1945, page 27.
- <sup>59</sup> The History of Landmines, page 37.
- <sup>60</sup> "Engineer Notes on the British Eighth Army," page 29. See also, Rommel, A Narrative & Pictorial History, page 243.
- <sup>61</sup> The Rommel Papers, page 457.
- <sup>62</sup> War in the Desert, The Eighth Army at ElAlamein, by James Lucas, Beaufort Books Inc., New York, 1982, page 203.
- <sup>63</sup> "Die Schlacht von El Alamein," pages 18 and 19.
- <sup>64</sup> Kesselring, A Soldier's Record, page 158.
- <sup>65</sup> Desert Warfare: German Experiences in World War II, page 49.
- <sup>66</sup> The Campaign in North Africa, 1941/3, Volume 2, The Campaign in the Year 1942, by *General der Panzertruppe* Walter Nehring, MS # T-3, Foreign Military Studies, Headquarters, US Army Europe, 1948, pages 349-350.
- <sup>67</sup> Germany's Panther Tank, The Quest for Combat Supremacy, by Thomas Jentz, Schiffer Publishing Ltd, Atglen, Pennsylvania, page 115. See also Encyclopedia of Tanks, page 153.
- <sup>68</sup> Encyclopedia of German Tanks of World War II, by Peter Chamberlain and Hilary Doyle, Arco Publishing Company, New York, pages 77, 116, and 209.
- <sup>69</sup> German Remote-Control Tank Units, 1940-1943, by Markus Jaugitz, Schiffer Publishing Ltd, Atglen, Pennsylvania, 1996. Also see "Mine and Countermine Operations in the Battle of Kursk," by Andrew Remson, unpublished manuscript, 1998.
- <sup>70</sup> The History of Landmines, page 65.
- <sup>71</sup> The Ordnance Department: Planning Munitions for War, United States Army in World War II, The Technical Services, by Constance McLaughlin Green, Harry C. Thomson, & Peter C. Roots, Office of the Chief of Military, Washington, D.C., 1955, page 461.
- <sup>72</sup> The Turning Point, With the N. Z. Engineers at El Alamein, page 166.
- <sup>73</sup> "The Assault at Alamein," pages 325-326.
- <sup>74</sup> Salute the Sappers, Part I. The Formation of the South African Engineer Corps and its Operations in East Africa and the Middle East to the Battle of Alamein, page 452.
- <sup>75</sup> "The Assault at Alamein," page 334.
- <sup>76</sup> "British Minefield Clearing Devices," page 17.
- <sup>77</sup> A History of the 44<sup>th</sup> Royal Tank Regiment in the War of 1939-1945, Part I, England and the Middle East, 1939-1943, page 78; and "44<sup>th</sup> RTR War Diary, 1942."
- <sup>78</sup> The Universal Tank, British Armour in the Second World War, Part 2, by David Fletcher, HMSO, London, 1993, pages 15-16, see also, "Scorpion: Recent Experiments," Military Reports on the United Nations, No. 12, Military Intelligence Division, War Department, 15 November 1943, pages 15-19.
- <sup>79</sup> The New Zealand Division in Egypt and Libya, Operations "Lightfoot" and "Supercharge", page 27.
- <sup>80</sup> New Zealand Engineers, Middle East, page 384.
- <sup>81</sup> Brigadier Frederick Kisch, Soldier and Zionist, page 179.
- <sup>82</sup> Sherman, A History of the American Medium Tank, by R. P. Hunnicutt, Taurus Enterprises, California, 1978, page 456-457, 461.
- <sup>83</sup> "Historical Excerpts of Mine Warfare Research and Development, 1942-1959," by H. C. Smith, MERADCOM Report # 1924, DTIC # AD 830-470L, March 1968, The Corps of Engineer: Troops and Equipment, by Blanche Coll, Jean Keith, and Hebert Rosenthal, Center of Military History, US Army, Washington, D.C., 1958, pages 468-482, and "Mine and Countermine Warfare in Recent History, 1914-1970," page 91.
- <sup>84</sup> The History of Landmines, page 55.
- <sup>85</sup> "Engineer Lessons from North Africa," Military Reports on the United Nations, No. 8, Military Intelligence Division, War Department, Washington, D. C., 15 July 1943, pages 41-44.



## 8. ANALYSIS OF CURRENT US DOCTRINE, ORGANIZATION, AND EQUIPMENT IN LIGHT OF THE SECOND BATTLE OF EL ALAMEIN

### 8.1. CURRENT RELEVANCE<sup>i</sup>

One of the first things that must be considered in analyzing current US Doctrine in the areas of mine warfare and breaching operations in light of events from the Second Battle of El Alamein is the differences between current capabilities and historical capabilities. Certainly, we still study the brilliant works of military philosophy by men like Carl von Clausewitz and Sun Tzu, at West Point, Ft. Knox, Ft. Benning and Ft. Leavenworth. Yet they both predate the industrial revolution, Sun Tzu by 2300 years. Their works deal with the “Art of War,” that intangible realm where strategy, leadership, human nature, chance, terrain and weather intersect to create the various immutable forms of conflict. These are believed to transcend technology.

Balancing the “Art of War” is the “Science of War,” the constantly changing domain of technology and technique. Plainly, the tanks and aircraft of today, in particular, are more effective than their counterparts from 50 years ago. The advent of the attack helicopter has also added another dimension to the fight. But how much more effective are these? How much has the relative effectiveness of these weapons types changed in relation to each other over the last 50 years? After all, the famous German ‘88’s routinely hit and killed targets 2,000 to 3,000 meters away (with a 19% probability of a first round hit) and relatively speaking, were not much less effective than our current TOW missile system or Rheinmetal’s 120mm smoothbore gun on the M1A1 Abrams. Certainly, the probability of a hit/kill is greater on current systems, however, the rate of fire is lower and the total number of the larger rounds typically on board a tank is also much lower. Nevertheless, the truism of “*What can be seen can be hit, what can be hit can be killed,*” certainly applied to this battle. In the area of fire support, the primary artillery piece of the 8<sup>th</sup> Army was the 25-pounder, a 87.5mm gun-howitzer, which could fire an 11.3 kilogram shell to a range of 12.3 kilometers. Therefore, the 25-pounder fired a lighter shell but to a greater range than the 105mm howitzer currently found in the US light divisions. So once again, the changes are more evolutionary than revolutionary. The standard tube-artillery piece in today’s US mechanized/armored division is the M109 155mm howitzer, which can fire DPICM (Dual Purpose Improved Conventional Munition) out to a range of 17 kilometers (or more using a RAP (Rocket Assisted Projectile) round). However, the targets on El Wishka Ridge were dug-in and would have had to be engaged using standard high explosive rounds. Another recent development is the highly effective MLRS (Multiple Launch Rocket System), which was fielded by the US in time to appear in the Gulf War. Nevertheless, the US Army tends to use the MLRS, as well as its attack helicopters for the ‘deep battle,’ not in the ‘close battle.’ In addition, most infantry now have various portable antitank weapons, but still do most of their killing with machine guns and assault rifles. It should be noted that the new assault weapons, particularly in the hands of properly trained infantry are significantly more effective than their breech-loading predecessors.<sup>1</sup>

Indeed, for a study focussed on breaching operations, it should also be noted that the vast majority of land mines encountered today are nothing, but product improvements on the German Teller and ‘S’ mines that played such a key role in the Second Battle of El Alamein. In addition, the US Army’s combat divisions, today, have very little breaching equipment that would not be immediately recognizable to a sapper from General Montgomery’s 8<sup>th</sup> Army (Table 33). Do these changes constitute a “discontinuity” in the record, such that technical data from over 50 years ago is no longer useful? It is the author’s belief that, based on relative combat effectiveness, recent technical advances have not fundamentally changed the nature of breaching operations and that useful tactical lessons can still be learned from the tactical study of battles fought from the Second World War to present. Indeed, there is still much that should be learned by the US light forces from the operations of the German storm pioneers of the First World War. This seems to be particularly true in the area of combat engineering, where the technical changes are sufficiently minor, that the lessons from El Alamein are still worthy of close consideration.

<sup>i</sup> For a more complete technical treatment of this complex issue, see Numbers, Predictions & War: Using History to Evaluate Combat Factors and Predict the Outcome of Battles, by Colonel Trevor N. Dupuy, The Bobbs-Merrill Company Inc., New York, 1979, particularly pages 6-18. Author’s note: this book appears to be the basis of most of the US Army’s current wargaming methodology. See also, The Evolution of Weapons and Warfare, by Colonel Trevor N. Dupuy, The Bobbs-Merrill Company Inc., New York, 1980, particularly pages 307-343; and A Guide to the Study and Use of Military History, John E. Jessup and Robert W. Coakley, Center of Military History, Washington, D. C., 1982 reprint, pages 14-39.



**TABLE 33. COMPARISON OF CURRENT US COUNTERMINE EQUIPMENT  
AND WORLD WAR II BRITISH**

	CURRENT US	WWII EQUIVALENT	REMARKS
Mine Detector	AN/PSS-12	Polish Detector	
Dismounted Explosive Breaching	Bangalore Torpedo	Bangalore Torpedo	The new APOBS is a definite improvement
Mine Rollers	Battalion Countermine Set (BCS)	Anti-Mine Roller Assembly (AMRA)	
Mine Plows	Battalion Countermine Set (BCS)	Bullshorn Plow	The British opted for the Scorpion instead
Mounted Explosive Breaching System	M58 Mine clearing Line Charge (MICLIC)	Demolition Snake	The first rocket deployed line charge was the British Conger, September 1944

## **8.2. REVIEW OF CURRENT US ARMY FIELD MANUALS IN LIGHT OF EVENTS IN THE 6<sup>th</sup> NEW ZEALAND BRIGADE ZONE DURING OPERATION LIGHTFOOT**

### **8.2.1. FM 90-13-1, COMBINED ARMS BREACHING OPERATIONS<sup>2</sup>**

The experience of the British Royal Engineers at El Alamein, in general, serve to validate the US Army's general breaching tenets (intelligence, breaching fundamentals, breaching organization, mass, and synchronization) for conducting breaching operations as set forth in FM 90-13-1. Specifically, the following points are supported, although the manual would be improved by placing increased emphasis on some of these.

#### **8.2.1.1. ENGINEER RECONNAISSANCE**

Specific technical information on the types of mines, emplacement techniques, and any other types of obstacles integrated to create a complex obstacle should be identified prior to undertaking breaching operations, if possible. The presence or absence of certain types of fuzes, the detectability, and vulnerability of the mines should influence the determination of the optimum breaching method. In the case of the New Zealanders, the general lack of anti-personnel mines allowed the infantry to move through a minefield and to secure the far side before the sappers began to reduce a lane. The lack of significant numbers of low-metal mines in the Axis inventory meant that the mines could be swept with the much faster electronic detector than would have been possible by simply probing for the mines.

#### **8.2.1.2. BREACHING FUNDAMENTALS, SOSR (SUPPRESS, OBSCURE, SECURE, AND REDUCE)**

Although the 8<sup>th</sup> Army plainly did not speak in these terms, they certainly integrated each of these "breaching fundamentals" in their plan. The lifting artillery barrage combined with preplanned concentrations on known or suspected Axis strong points served to suppress the Axis troops in zone, particularly the grenadier company in the combat outpost line. However, it should be pointed out that this suppression was only temporary and had to be exploited immediately to be of utility. To conceal their breaching operations, the British had planned the initial attack for a moonlit night; in addition, the lifting artillery barrage included some smoke and was expected to raise enough dust to significantly obscure visibility. The New Zealand infantry battalions secured the breach sites by advancing ahead of the sappers through the mostly anti-tank minefields. They were able to eliminate most Axis positions before they could effect the course of the breach. It is unlikely that this technique would be viable for crossing minefields with an adequate mix of anti-personnel mines. Nevertheless, it would seem to merit careful reconsideration if the Ottawa Treaty (which attempts to ban anti-personnel mines) is actually effective at eliminating anti-personnel mines as a significant threat (admittedly, this is highly unlikely). The reduction techniques and equipment used by the Allies have been described extensively in the chapters 5 and 6.

#### **8.2.1.3. OBSTACLE BYPASS**

From studying the mine/countermine operations conducted by both sides during the campaigns in North Africa, it is apparent that minefield bypasses come in one of two forms. The first is the 'operational' bypass, as executed by Generalfeldmarshal Rommel's panzerarmee during the opening phases of the Battle of Gazala in May 1942. In this situation, a large formation simply avoids an obstacle zone (similar to the German Bypass of the Maginot Line in 1940), and remains outside of indirect fire range. The other possibility is the tactical bypass. This is attempted when an opponent is close at hand, indeed, within direct fire range. In this situation, the possibility that this is a 'turning obstacle' that will lead one into a preplanned engagement area must be carefully considered. In fact, it may be prudent to have scouts reconnoiter an apparent bypass thoroughly first before committing the main body of a unit to such a course. These differences are not currently addressed in US doctrine, but should be discussed in FM 90-13-1.

#### **8.2.1.4. BREACH LANE CHARACTERISTICS**

Upon considering the resources available to them, the Royal New Zealand Engineers and the Royal Engineers of the 10<sup>th</sup> Armoured Division believed these were sufficient for only eight 8-yard wide lanes through the Axis minefields across the 2<sup>nd</sup> New Zealand Division's 2,700 meters of frontage. They felt this was marginal from a tactical standpoint and constituted a significant risk to the overall chance of success for the operation, but could find no better alternatives given the means at hand. With an initial spacing of about 300 meters between lanes, a single artillery sheaf from an Axis artillery battery could only affect a single lane at a time. Along Phase Line Oxalic, this expanded to over 700 meters between lanes. The 100-meter minimum spacing in current US practice would seem to be too small, and should probably be revised and based on threat indirect fire capabilities. The number of lanes planned and executed by the New Zealanders was only half of that recommended by current US practice of two per assaulting battalion task force, additionally, the small reserve of manpower with each breach lane was well below the 50% redundancy recommended by US practice. However, each brigade had a troop of three Scorpions in reserve, which somewhat offset this. Of the eight lanes attempted in zone, two failed to reach Phase Line Oxalic, but only because of a navigational failure by the 25<sup>th</sup> Infantry Battalion, which stopped well short of its objective. It should be noted that the one-vehicle wide lane, provided by current US practice, would certainly encounter the same degradations over time as those described in the narrative. However, some lanes made with blades (such as the track-width mine plow) can not be safely or easily widened because of the presence of mine-laden berms created on both sides of the breach as well as the uncleared centerline. In this case, it would seem to be expedient to create an additional lane about ten meters to the left or right of the initial breach to establish two-way traffic, rather than actually attempting to widen an existing lane. It would also appear that the importance of establishing two-way traffic is inadequately considered in current US practice and should be discussed in more detail, particularly for casualty evacuation and the return of empty supply vehicles.

#### **8.2.1.5. BREACH ORGANIZATION**

During Operation Lightfoot, the tasks of the support force were largely the responsibility of the infantry battalions that led the way forward. The breach force was largely the responsibility of the engineers, with some attachments of signals troops and military policemen. The assault force was provided by the 9<sup>th</sup> Armoured Brigade and the follow-on 10<sup>th</sup> Armoured Division, who's mission it was to pass through the breach and continue the attack to Phase Line Pierson. In no way could the three elements of this breach organization be described as "synchronized," there was little or no feedback between them. As a result, a difficult and complex operation was further complicated by poor communications and regimental/branch parochialism. The 8<sup>th</sup> Army's efforts were made in parallel with very little interaction. The lack of integrated maneuver (infantry or armor) elements with the Minefield Task Force of the 10<sup>th</sup> Armoured Division resulted in unnecessary delays. The better balanced force used by the 1<sup>st</sup> Armoured Division appears to have been a superior, more robust arrangement. The 8<sup>th</sup> Army's allocation of one section (equivalent to a large platoon) per lane is in keeping with current US practice. As demonstrated by events in the New Zealand Division zone, vehicle recovery assets must be integral to the breach force to allow engineers to rapidly remove immobilized vehicles from a lane before traffic is brought to a halt under hostile fire. These assets must also be readily available to the military police units that are left to provide traffic control through a breach site, after the combat engineers have moved on with the rest of the combat forces.

#### **8.2.1.6. MASS AND SYNCHRONIZATION**

In the final assault along Phase Line Oxalic, three quarters of the New Zealand Infantry Battalions that attacked the division's final objectives were able to achieve their assigned tasks. They had been able to attack in a tactical formation and at approximately the same time as the rest of the assaulting battalions because they were following the lifting barrage. This helped them to achieve both mass and synchronization after a sort. However, that was not the case for the follow-on armor units, which had to attempt to deploy from a column along one of the five successfully completed breach lanes. Pressed to reach Phase Line Pierson before dawn, the tankers attempted to push on as rapidly as possible without synchronizing the progress on the different lanes, which were naturally finished at different times. As a result, they could not achieve the mass required to continue the advance to Phase Line Pierson. They could only deploy slowly from the breach exit in small groups under the guns of Kampfgruppe Sud with predictable results. To prevent such a result in the future, US forces must fight as combined arms task forces and fully exploit the promise of current communications technologies.

#### **8.2.1.7 FOLLOW-ON FORCES**

In deeply mine areas, the requirement for engineers to conduct area mine clearance tasks assumed greatly increased importance. Consideration should be given in the manual for how such organizations are formed and employed, as well as what type of equipment can best perform that task.

#### **8.2.1.8. BREACH TRAINING**

The breach training performed by the 8<sup>th</sup> Army cannot be praised highly enough, the methodology pursued and the rigorousness of the training was superb, including the use of integrated combined arms live fire exercises. Most importantly, the 8<sup>th</sup> Army recognized that, since high casualties could be expected among the sappers, every one had to be well trained in all appropriate tasks, individual and leadership. The high casualties among the engineer leadership of the 8<sup>th</sup> Army are notable. Considering the plethora of tasks assigned to the engineer in war time situations, the 'battle focus' training currently mandated by the US Army seems to run counter to the need for a flexible set of military engineers. The narrow focussing on a few select tasks may produce an engineer force without the breadth of skills and experiences to deal with the unexpected situations that always seem to arise in combat. Certainly, it would appear that breaching operations merit intense training in peacetime, one cannot expect to be able to look up breaching operations in a handbook the night before an operation and be successful. However, many other engineer tasks lend themselves fairly well to a philosophy that says if one has some practical experience with most of the countermobility and survivability tasks, then one can pull out the book during active campaigning, follow the book, and do a reasonably effective job.

#### **8.2.2. FM 90-7, COMBINED ARMS OBSTACLE INTEGRATION<sup>3</sup>**

If the Second Battle of El Alamein reaffirmed most of the US Army's new breaching doctrine, the creativity and effectiveness of the "Devil's Gardens" calls into question some of the basic philosophy in FM 90-7. Deeply mined zones, with a thick crust (to get the opponent's attention) followed by more dispersed minefields, greatly inhibited the ability of allied forces to maneuver for the first several days of the Second Battle of El Alamein. However, the lack of construction equipment and barbed wire significantly limited the ability of the Axis engineers to create complex obstacles. This significantly decreased the complexity of the breaching operations for the Allies. A study of German mine tactics, in light of their shortage of anti-personnel mines and the US's political decision to deprive our soldiers of these useful items, would seem prudent. The lack of anti-personnel mines definitely made it much easier for the Allies to breach the "Devil's Gardens." In such a situation, plainly more infantry and fire support will be necessary to successfully cover the anti-tank minefields and defeat a hostile breaching attempt. In developing our obstacle doctrine, it should be remembered that light infantry units (like the 164<sup>th</sup> *Leicht Afrika* Division) are the ones most likely to be assigned such defensive missions. US mechanized infantry and armored divisions are extremely powerful organizations, and in a defensive situation, would probably be employed in a reserve role (like that of the 15<sup>th</sup> Panzer and Littorio Armored divisions).

##### **8.2.2.1. OBSTACLE DESIGN**



As shown during the retreat of the panzerarmee through Halfaya Pass, what are today called 'block' obstacles should be designed to defeat an opponent's breaching capabilities. Such minefields should be deep enough to require multiple line charges. Plows or rakes can be degraded by using a large number of anti-handling devices on large mines (such as the M15 or M19) in the second or third row of a minefield. Employed in this fashion, they would be encountered by the plow or rake after the device was committed. Employed in the same part of a minefield, coupled mines could be used to defeat plow, rake, roller, or signature duplicator equipped vehicles. The more complex the obstacle and the more varied the mine types emplaced, the more likely a breach will fail. In addition, where possible, obstacles should be sited along a reverse slope (as the 220<sup>th</sup> Pioneer Battalion had done along Miteiriya Ridge). This forces the breaching team to expose themselves without their support elements being able to get into a position to provide adequate direct fire support. FM 90-7 should be upgraded to include a list of the most common breaching equipment in use worldwide along with their technical performance characteristics. Then, generic weaknesses and countermeasures should be discussed. In addition, as demonstrated by the attempt to use the New Zealand Cavalry as scouts for the larger Sherman and Grants, the need exists to allow scouts to pass through an obstacle belt unmolested (indeed, undetected by the scouts). Then, the obstacles would be remotely closed or activated behind them, thus catching the following main body in an engagement area. The presence and actions of hostile scouts and advanced guards must be considered when designing an obstacle plan. The obstacle plan must consider the expected hostile assault formation (as a function of time and location) and be thoroughly war-gamed against someone knowledgeable on threat engineer capabilities in order to confirm that obstacle design intents match obstacle design performance.

The only obstacles that appear to have achieved a tactical 'turn' effect during the Second Battle of El Alamein were marked minefields. Obstacles such as marked/surface laid minefields or anti-tank ditches are visible to an attacker and his scouts, thus deliberately presenting them with the option to either breach or avoid the obstacle. The typical human response, of course, will be to avoid the obstacle unless there are extenuating circumstances, such as a marked minefield that extends across a zone of attack as the British XXX Corps faced at the beginning of Operation Lightfoot. It would appear to be advantageous to modify current US practice to specify that a turn obstacle should have a visual component. This would also appear to be a good use of a dummy minefield or an anti-tank ditch with prepared charges that can be remotely activated to open counterattack lanes as the opponent turns and exposes his flank. Taking this a step further, it would be highly advantageous to develop mines that attack only hostile (but not friendly) forces, either through command self-destruct, remote control on/off, or an effective IFF (Identify Friend or Foe) feature.

To disrupt a hostile attack, many scattered small minefields containing low-metal mines (such as the US M19 antitank mine) greatly complicate the movement of follow-on and support troops behind a main attack (as the German pioneers ably demonstrated at El Alamein). However, the US engineer planner should give careful consideration to restricting this type of obstacle to zones that the US does not plan to execute mounted maneuver through. In addition, these scattered mines could be placed in large, fenced areas. Mined areas of sufficient depth (several kilometers) will severely restrict maneuver options for an attacking opponent and force them to divert engineer assets away from breaching missions to rear area clearance tasks in order to be able to displace his artillery (both field and air defense) and conduct normal, vehicle-based logistic activities.

The "Devil's Gardens," specifically designed to defeat a mounted force, were very successful in terms of disrupting the attack of the Allied armored units during Operation Lightfoot. Nevertheless, the lack of sufficient anti-personnel mines and wires entanglements meant that they were far less effective against the dismounted infantry of the XXX Corps, which led the assault. Although Field Marshal Rommel had not expected a frontal assault by dismounted infantry, which had not previously been used to lead an armored assault during the campaign in North Africa, his defensive plan certainly considered the possibility. However, it should be noted that, due to logistic constraints, the "Devil's Gardens" were only partially completed while 66% of anti-tank mines required were emplaced, only about 17% of anti-personnel mines and 6% of wire obstacles were completed when the 8<sup>th</sup> Army launched Operation Lightfoot. Obviously, an effective obstacle doctrine must adequately consider both mounted and dismounted opponents. The removal of non-self destruct anti-personnel mines from the US inventory increases the risk to US personnel from dismounted attack. It should be pointed out, that, historically dismounted opponents have caused the US the most problems as shown by our relatively poor performance in Korea, Vietnam, and Somalia. The US Corps of Engineers must develop the technology and doctrine that will adequately compensate for the loss of this protection. Although current US practice teaches the use of situational obstacles like

those used so effectively by the German pioneers at El Alamein and the Soviet sappers at Kursk, US doctrine seems to lack specificity by comparison. This doctrine should be improved.

#### **8.2.2.2. REMOTE SENSOR INTEGRATION**

In partial compensation for the loss of our effective non-self destruct anti-personnel mines, the US Army should fully integrate remote sensors to simplify the requirement to cover minefields and other obstacles with fire. "Owning the night" is critical to preventing stealthy hostile breaching operations during periods of limited visibility. The US Army Engineer School should consider adding a block of instruction on remote sensors and their integration with mobility and countermobility operations to EOAC (Engineer Officer Advanced Course) and EOBC (Engineer Officer Basic Course). The employment of remote sensors to cover deep obstacles should be incorporated into FM 90-7, Combined Arms Obstacle Integration.

#### **8.2.3. FM 20-32 MINE/COUNTERMINE OPERATIONS<sup>4</sup>**

##### **8.2.3.1. ANTIPERSONNEL MINES**

Since, the tactical considerations of mine warfare were covered above in the discussions of the 90-series field manuals, this section will deal primarily with technical concerns. In light of the loss of non-self destruct anti-personnel mines due to political issues, it is essential that any anti-personnel mine alternative provide the same level of reliability and effectiveness in all environments (jungle, mountain, arctic, etc.). In the interim, the US should field improved electronic antihandling devices for its conventional antitank mines (M15s and M19s) to discourage the lifting (and reuse against us) of these mines by hostile dismounted sappers. As shown by the Axis (and incidentally, American engineers committed on short notice to combat in Korea, the Philippines and Guadalcanal), there are circumstances where combat engineers have to be prepared to make their own mines. Since improvised explosive devices are legal under the Ottawa Treaty, the US should develop and publish PMD-6 (schumine) drawings that the soldiers in the field could assemble as necessary. The German pioneers, in particular, demonstrated the importance of being able to emplace cunning booby traps as part of their repertoire. In addition, all future US mines should be fitted with an integral antihandling device that can be activated at the discretion of the user. Also, current US conventional mines are technologically inferior to most of their counterparts. US scatterable mines have extremely short self-destruct times, none greater than 15 days. There are easily foreseeable situations in which it may be desirable to lay long-term barrier minefields, similar to the ones currently maintained by the Americans and South Koreans along the DMZ (Demilitarized Zone) to protect the peace and deter an invasion from communist North Korea. As demonstrated by engineers on both sides at El Alamein, dismounted sappers should be proficient in arming/disarming foreign mines, clearing unexploded ordnance, boobytrap detection and neutralization, area clearance, and minefield recording.

##### **8.2.3.2. BOOBYTRAPS**

The current method for neutralizing boobytraps described in the 12B20 soldier's manual is dangerous against advanced traps and needs to be revised. Nevertheless, it is recognized that there are times when destruction in place is undesirable. A better method for rapidly and safely neutralizing boobytraps must be developed.

##### **8.2.3.3. TECHNICAL INFORMATION**

The US combat engineers also lack a comprehensive reference that identifies and describes the technical characteristics of threat mines, minefields, and boobytraps. TM 5-280 Foreign Mine Warfare Equipment performed this function, however, this manual has been rescinded. Currently, US Explosive Ordnance Disposal (EOD) Teams use the TM 60H series (EOD Procedures for Land Mines), but this excellent source of information is restricted to EOD personnel only. The widely distributed "Mine Facts" Compact Disk (and similar products) has been a significant improvement; however, these must be expanded in scope and maintained.

##### **8.2.3.4. REALISTIC TRAINING**

Although US mine/countermine doctrine has improved considerably over the last 15 years, it is necessary to do a much better job implementing this doctrine at the Army's maneuver training centers. The NTC (National Training Center), CMTC, and JRTC (Joint Readiness Training Center) must accurately replicate the mine threat and US countermine capabilities as realistically as possible in order to insure that US forces become more proficient in mobility operations. Particular attention should be paid to integrating the SAWE (Simulated Area Weapons Effects) mines into training, as this will force maneuver commanders to learn to realistically counter the threat posed by the ubiquitous mine.

Given the ubiquitous nature of the mine threat and the widely varied missions that the military is now being tasked to do, it is unlikely that properly trained personnel will be on hand when a mine is encountered. Because of their widespread, often indiscriminant use, mines have become a "condition of the battlefield" and all personnel should be trained to take basic countermine measures in the same fashion as they are currently taught NBC skills. In order to learn from each encounter, a reporting system similar to that developed toward the end of the Vietnam War should be developed and implemented Army wide. The Corps of Engineers must develop and issue a kit containing samples of a representative cross section of the mines in use worldwide.

#### **8.2.4. FM 5-250 EXPLOSIVES AND DEMOLITIONS<sup>5</sup>**

##### **8.2.4.1. COMMERCIAL AND FOREIGN EXPLOSIVES**

The engineers of all nations that participated in the Second Battle of El Alamein had to make extensive use of commercial or foreign military explosives and associated equipment. Considering the current frequency of coalition operations with allied or United Nations forces, US engineers should be prepared to use demolitions materials that may be available from these sources. US combat engineers have experienced this same requirement in most combat operations in the 20<sup>th</sup> century.

##### **8.2.4.2. DEMOLITION OF CAPTURED EQUIPMENT AND ORDNANCE**

In addition, the manual should include a section on the destruction of captured equipment and ordnance. As with the Royal Engineers at the Second Battle of El Alamein, American combat engineers, during both operations Desert Storm and Restore Hope, were called upon to assist in the destruction of captured equipment and ordnance.<sup>6</sup> This is a dangerous undertaking, if not done properly. These deficiencies in US combat engineer training inhibit the responsiveness of the men who may be called upon to perform these missions. Considering the current US expectation of conducting operations in conjunction with other countries, FM 5-250 should be upgraded to include, at a minimum, one appendix with catalog type information on common foreign and commercial explosives, and another with information on techniques used to destroy various stores, facilities (ammunition stockpiles etc.) or equipment. Alternatively, this information could be disseminated through a technical manual.<sup>1</sup>

#### **8.2.5. FM 101-10-1/2 STAFF OFFICERS' FIELD MANUAL; ORGANIZATIONAL, TECHNICAL, AND LOGISTICAL DATA PLANNING FACTORS (VOLUME 2)<sup>7</sup>**

The 2<sup>nd</sup> New Zealand Division took about 904 casualties (5.7% of its assigned strength of approximately 16,000 men) during the 12-hour period from 2200 hours on 23 October to about 1000 hours on 24 October. This casualty rate is comparable to that predicted on page 4-9 of this manual. However, engineer casualties were more than double (3.2% versus 1.5%) those predicted. From an engineer standpoint, breaching operations are particularly dangerous. Perhaps this figure should be carefully reviewed and reevaluated.

#### **8.2.6. FM 101-62 SERIES, JOINT MUNITIONS EFFECTIVENESS MANUALS (JMEM)**

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<sup>1</sup> A very good starting point could be the Central Region Engineer Interoperability Handbook, Part 2, "Platoon/Squad Leaders Field Pocketbook", ENTEC (Euro NATO Training Engineer Centre), Munich, Germany, June 1993.



The US engineer staff officer currently lacks information on the technical performance of various mine/countermine systems that he needs to be able to support the preparation of the Engineer Battlefield Assessment. In addition, data on survivability blade hours required to dig-in various combat support and combat service support organizations to a specified level of protection are completely lacking. Some examples of the needed information include the performance of explosive breaching systems (such as MICLIC and Bangalore torpedo) against various mine fuze types, the performance of US mine detectors against low metallic content mines at various depths and soil types, and the performance of common foreign mines. This type of information is normally available in JMEM, which are normally classified. Such material needs to be consolidated and published in a single classified reference.

### **8.3. REVIEW OF US COMBAT ENGINEERING EQUIPMENT AND ORGANIZATION IN LIGHT OF THE BATTLE OF EL ALAMEIN**

This section will review current US mobility, countermobility and survivability equipment and combat engineer organizations based on the results of the Battle of El Alamein. The first thing to note is that, although much better equipped than the 8<sup>th</sup> Army in many ways, the current US Army would be hard-pressed to conduct a breaching operation under conditions similar to those faced by the Allies at the Second Battle of El Alamein. Indeed, *“the AT mine is the biggest problem still unlicked. Various Solutions have been propounded-none of which are quite satisfactory. A real solution would speed the end of the war by six months, for it would double the use of the tank as an effective weapon.”*<sup>8</sup> The problem with landmines has continued to plague the US Army since World War II. A wholly satisfactory solution is still lacking, as shown in training and combat experience. These experiences continue to reveal numerous deficiencies in the ability of American combat engineers to execute breaching operations in a timely fashion. However, it must also be pointed out that breaching operations are a combined arms responsibility and that not all of the equipment that performs combat engineer functions belongs to the combat engineers. In particular, armor, infantry, artillery, and aviation units possess significant inherent capabilities in the areas of mobility, countermobility and survivability. They also have requirements in these areas that they can not meet with their own internal assets.

Plainly, the greatest combat power is achieved when these elements are effectively employed in a combined arms team. Done properly, this maximizes the strengths of the various arms while minimizing their weaknesses and vulnerabilities. In order to achieve the maximum success at the minimum cost, all of the combat elements of a combined arms team require the same basic levels of protection and mobility. In equipping its armored and mechanized divisions, the US Army has frequently neglected the unglamorous combat engineers, thus jeopardizing the success of these units and placing the lives of all combat soldiers at needless risk. Much of this has occurred through faults on both the maneuver and the engineer sides. Contrary to General Guderian's recommendations on organizing and equipping a mounted combined arms team, the US armor community has frequently been unwilling to allow the allocation of modern tank hulls to the combat engineers to support the armor's own mobility/countermobility requirements. The infantry has also been reluctant to allocate modern APCs or IFVs to the combat engineer squads. The Corps of Engineers, for their part, has too many non-combat tasks “on its plate” and frequently has done a poor job articulating combat engineer requirements, indeed, the Corps of Engineers frequently does not act like a combat arm and therefore, is not treated like one. As a result, the combat engineer soldiers are called upon to lead their maneuver brethren into and through a breach while under the heaviest fire on the modern battlefield, with antiquated equipment.

#### **8.3.1. MOUNTED COMBAT ENGINEERING EQUIPMENT**

##### **8.3.1.1. US ARMORED BATTALIONS**

**8.3.1.1.1. Mobility.** Obviously, the ideal, long-term mobility goal for US mounted maneuver units is to be able to conduct breaches in-stride and in-formation. This would eliminate the time lost changing from combat formation to column (to pass through the lanes) and back to combat formation, as well as the vulnerability of elements while confined to a few narrow, congested breach lanes as they traverse the obstacle.

**Battalion Countermine Set.** At present, a US armored battalion is authorized (although not necessarily equipped with) the Battalion Countermine Set. This set consists of 12 track width mine plows, 4 track width mine

rollers, and 16 improved dog bone assemblies (which clear magnetic fuzed mines). The marking system (CLAMS, Cleared Lane Marking System) that was originally fielded with the set was found to be inadequate during Operation Desert Storm and withdrawn from service. It has not been replaced.<sup>9</sup> It should be noted that the BCS did not enter US service until 1990, just prior to the Gulf War. From World War II until that time, the US Army did not have any standard mechanical mine breaching equipment in its armor battalions.

This Battalion Countermine Set gives the modern US armored battalion considerably more breaching capability than that enjoyed by its British predecessor at El Alamein. A single US armor battalion can reduce 6 to 12 lanes, without engineer assistance, depending on the situation. During Operation Lightfoot, the British had only enough dismounted breaching assets to attempt to reduce four lanes for the entire 10<sup>th</sup> Armoured Division, with the resultant delays and problems described in chapter 6. In addition, MIs equipped with mine plows do not suffer a significant degradation in cross-country mobility (and neutralize mines at about 10 kph versus 0.12 kph for dismounted sappers (unopposed with detectors), 0.8kph for the Scorpion (when they worked) or 2.5 kph for the AMRA rollers). However, it should be noted that roller equipped MIs must move separately from the lead elements of an armored battalion advancing faster than 5 to 15 kph. When a unit does this, it is, of course, accepting the risk that it will find a minefield the old fashioned way, at the first detonation. In addition, a lane breached by a plow-equipped tank does not require immediate marking as it is obvious what ground has been cleared. However, the plow may not be useable in certain ground conditions such as in rocky or frozen soil. The rollers, on the other hand, have a tendency to bog down in soft sand and mud. Also, the additional 10-ton weight of the rollers can significantly limit the mobility of the host vehicle due to the load limitations of bridges found in many parts of the world. Nevertheless, the rollers are generally useful for route clearance (assuming the local bridges can support the roller vehicle) and for proofing breach sites. Plainly, a road can not be plowed, and remain a road. To be effective, the BCS must be fully fielded and the tank crews thoroughly trained on its employment.

Considering the US armor community's long and understandable reluctance to accept the low speed that results from having roller equipped tanks in an armor battalion, the rollers should be transferred to the mechanized engineers (along with sufficient M-1s to execute the mission). This was how the 8<sup>th</sup> Army solved this problem with many of their rollers prior to Operation Lightfoot. It should be noted that this was also the result in Vietnam, where the ENSURE 202 roller was ineffective with the armor battalions but proved to be very useful when used on the CEVs of the combat engineer battalions, since the engineers were more willing and able to adapt to this technology's limitations.

**Mine Resistant Tanks.** As shown at the Second Battle of El Alamein, tanks and other vehicles are very vulnerable to simple blast anti-tank mines. In the time since El Alamein, the amount of explosive in the largest of this type of mine has approximately doubled from 5.5 kg of TNT (Tellermine 35) to 9.9 kg of Composition B (US M15). This type of mine has remained cheap, effective, and common, an ideal "asymmetric" weapon. Indeed, this type still constitutes the vast majority (over 90%) of the mine threat to US tanks. Despite the best efforts of the sappers, it must be pointed out that some mines may be missed in a breach. In addition, the sappers cannot possibly check every square meter of the battlefield for mines in a timely fashion. Therefore, the mobility and survivability of the tanks, and other tracked vehicles must be significantly enhanced. Fielding the mine resistant tracks and suspension that the US developed in the late 1970s and early 80s can accomplish this. Technology is now available that allows tanks to survive an encounter with all known standard blast anti-tank mines with out losing a track (although, there will likely be some loss in mobility). It is important to point out, that this new technology will not decrease the speed of the host vehicle and even provides a slight weight savings over the current US design.<sup>10</sup> This technology would also provide protection for mine plow equipped tanks from deep-buried anti-tank mines, a frequently cited countermeasure to the Grizzly.<sup>1</sup>

**Mine Resistant Wheeled Vehicles.** It should also be pointed out that, again as shown at El Alamein, the critical wheeled logistics vehicles with the ammunition and fuel necessary for the continued operation of mechanized units are also very vulnerable to mines. Since the North African campaign, soldiers have frequently

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<sup>1</sup> Influence-fuzed anti-tank mines equipped with a shape or platter charge are becoming an increasingly common threat. These can be defeated by spaced armored plate under the front half of the vehicle.

resorted to improvised vehicular mine protection in the form of sandbags and other expedients. If done improperly, these improvised efforts may actually increase the chance of crew casualties, as well as degrade vehicle life and performance.

As shown by the South Africans in the 1970s and 1980s, mine resistant technologies can also protect wheeled vehicles.<sup>i</sup> The early third and fourth generation mine resistant vehicles from southern Africa have been proven to reduce wheeled vehicle crew casualties due to mines by as much as 60 to 70 percent while virtually eliminating fatalities (less than one percent of vehicle occupants). Using a four-axle design, it is possible to produce a “5<sup>th</sup> generation” wheeled mine resistant vehicle that can continue moving after detonating an anti-tank mine. This technology can be applied to many of the vulnerable support vehicles as shown by the many variants of the Casspir that include: personnel carrier, cargo carrier, fuel tanker, and wrecker. These technologies have also been shown to minimize vehicle repair times and cost, thereby increasing vehicle availability and hence mission readiness.<sup>11</sup>

**8.3.1.1.2. Survivability.** As demonstrated by the tank casualties taken by the British 10<sup>th</sup> Armoured Division when they were caught in the open between Miteiriya and El Wishka Ridges on the morning of 25 October, armored units need to be able to self-entrench rapidly. In this area, the current US armored battalion is no better off than its British predecessor. However, as shown by some current Russian tanks, there is an alternative in the form of a self-entrenching blade (issued one per platoon in their case). An even greater capability would be provided by a return to the tank-dozer as used by the Americans during World War II. This would also give the US armored battalion improved mobility by providing the capability to remove roadblocks. One thing that must be considered about increasing the ability of an armored battalion to self-entrench is the signature created by digging in. In an era of sophisticated (commercially available) sensors and precision guided, long-range antitank munitions, a hull-down position may become nothing more than a bull’s eye that says ‘shoot here.’ To achieve a significant survivability enhancement by digging in, it will be necessary (against some threats) to field improved, multi-spectral camouflage.

### **8.3.1.2. US MECHANIZED INFANTRY BATTALIONS**

**8.3.1.2.1. Mobility.** US mechanized infantry battalions rarely operate “pure.” Normally, they operate with task-organized armor. As a result, most of the breaching tasks can be left to the tanks and mechanized combat engineers. Nevertheless, it would be prudent to fit all of the tracked AFVs in the mechanized infantry battalions with mine resistant tracks and suspensions for the reasons described above. Also, the Bradleys should be fitted with magnetic mine countermeasures (such as the VEMASID or FECS). This will provide a self-extraction capability against most scatterable anti-tank mines. Additionally, like the tank battalion, the unarmored, wheeled support elements that are so critical to the long-term success of a mechanized unit, must also be fielded with mine resistant vehicles.

**8.3.1.2.2. Survivability.** Like the tank battalions, the mechanized infantry battalions need to be able to self-entrench. Maneuver units are frequently exposed to heavy artillery fire, yet are frequently comparatively low priority for entrenching support from their combat engineers. The mechanized infantry will also require advanced camouflage to defeat the advanced sensors that are becoming commercially available.

### **8.3.1.3. US SELF-PROPELLED ARTILLERY BATTALIONS**

**8.3.1.3.1. Mobility.** As shown at El Alamein, scatterable mines are a threat to the ability of the artillery to rapidly displace and move. Since fire support units normally deploy away from the main battle area, combat engineer support for extracting artillery from scatterable mines is limited and may not be available in a timely fashion. Random mines emplaced outside of standard minefields pose a secondary threat to the artillery. Therefore, the self-propelled artillery battalions (both M109 and MLRS) have combat engineering requirements similar to those of the mechanized infantry. They should be equipped with magnetic mine countermeasures (such as the

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<sup>i</sup> Indeed, it is possible that the South Africans may have been influenced in their designs by the unusual mine resistance recognized in the American-built Marmon-Harrington armored cars that some of their reconnaissance units were equipped with in North Africa. For unknown reasons (but probably related to increased ballistic protection), this design included a boat shaped hull that serendipitously deflected mine blast away from the vehicle. However, this influence can only be conjectured at this time.



VEMASID or FECS). This will provide a self-extraction capability against most scatterable anti-tank mines. The tracked AFVs should also be equipped with mine resistant tracks and suspensions. Additionally, like the tank and mechanized infantry battalions, the unarmored, wheeled support elements must also be fielded with mine resistant vehicles.

One important change in the nature of the mine threat since the Battle of El Alamein is the proliferation of blast resistant mines. The tactic of using concentrated artillery fire or aerial bombing (given currently available munitions, including fuel-air explosives), to breach a minefield is obsolete. Even when this method was technically viable, the diversion of artillery and aerial bombing assets from hostile units to obstacles was tactically questionable. Nevertheless, it would be highly desirable to be able to use fire support assets to breach minefields from a safe standoff and then just drive through the breaches (assuming the location of the breach can be known with sufficient accuracy). However, it should be pointed out that there is currently no such munition under development (or even foreseen) in the US.

**8.3.1.3.2. Countermobility.** A very important countermobility development in respect to artillery since the Battle of El Alamein has been the introduction of artillery scattered mines. The first appeared in the 1970s when the US introduced the highly sophisticated ADAM/RAAM rounds. Regrettably, the US Army chose to use only their 155mm howitzers to deliver its artillery-scattered mines. This limited their range to 17 kilometers and requires significant amounts of firing time to emplace. In addition, only 4 or 48 hour self-destruct times are available. These constraints have made ADAM/RAAM very difficult to employ effectively. Since the introduction of ADAM/RAAM, many other nations (Britain, Russia, Germany, Italy, China, etc.) have fielded artillery-scattered mines. However, these nations have opted for various MRL (Multiple Rocket Launcher) based systems. Many of these have significantly longer ranges, can emplace the mines rapidly, and have a greater range of self-destruct time options. Only the French have fielded a system comparable to ADAM/RAAM. The short self-destruct times available may make frequent reseedling necessary, thus placing greater strain on the artillery and logistic support. To reap the maximum benefit from its highly advanced mines, the US must develop and field rounds for the MLRS that can rapidly deliver mines (as well as the new wide area munition called the 'Hornet') to much greater ranges and with greater self-destruct time options. As shown during the Battle of El Alamein, surface scattered mines are often relatively easy to detect and deal with. If the US Army is forced to retire its self-destructing anti-personnel mines because of political pressure, new techniques for protecting the anti-tank mines will have to be developed. Options in this area include camouflaging these mines better or having them self-bury (using their impact energy to go underground or some other mechanism).

**8.3.1.3.3. Survivability.** Like the mechanized infantry and armored battalions, the self-propelled artillery battalions need to be able to self-entrench. The primary threat to US artillery is generally believed to be counter-battery fire. However, experience has shown that there are rarely enough entrenching assets with the combat engineers to provide the artillery with the desired level of protection in a timely fashion. The artillery will also require advanced camouflage to defeat the advanced sensors that are becoming commercially available.

#### **8.3.1.4. US COMBAT AVIATION BRIGADES**

Although the Germans and Americans used early helicopters during the Second World War, it was not until the introduction of the modern helicopter gun ship by the US in Vietnam that combat aviation reached maturity. This marked a significant improvement in our ability to fight an opponent deep. The armies at El Alamein lacked a similar integrated deep battle capability. Their air support could only provide interdiction of the battlefield.

**8.3.1.4.1. Countermobility.** A very important countermobility development in respect to helicopters since the Battle of El Alamein has been the introduction of helicopter scattered mines, beginning in 1975 when the US introduced the M-56 system, which scattered M-34 anti-tank mines from a UH-1 helicopter. With the recent fielding of the Air Volcano mine scattering system, the US has a potent, responsive way to emplace mines (especially flank or situational obstacles) in areas out of the reach of the ground bound combat engineers. In addition, Air Volcano gives US division commanders the capability to fight the deep battle as a combined arms operation by using scatterable mines to shape engagement areas covered by MLRS and attack helicopters. Nevertheless, the Air Volcano shares some of the same deficiencies as the ADAM/RAAM. They have only 4 or 48-

hour self-destruct times available and are surface scattered. As stated earlier, in order to reap the maximum benefit from its highly advanced mines, the US must adapt the Wide Area Munition for emplacement by Air Volcano, as well as develop a greater range of self-destruct times for all of these mines. As shown during the Battle of El Alamein, surface scattered mines are often relatively easy to detect and deal with. If the US Army is forced to retire its self-destructing anti-personnel mines because of political pressure, new techniques for protecting the anti-tank mines will have to be developed. Options in this area include camouflaging these mines better or having them self-bury (using their impact energy to go underground or some other mechanism).

**8.3.1.4.2. Survivability.** Although the assets of a divisional aviation brigade are very vulnerable to hostile artillery fire and air strikes, unlike its maneuver and artillery brethren, the combat aviation battalions lack organic assets that can be adapted to provide a rapid self-entrenchment capability. For this reason, ensuring the survivability of the aviation brigade is normally a very high priority for the divisional engineers. However, the divisional engineer assets proposed for Force XXI and AAN (Army After Next) are insufficient. An acceptable solution to this shortcoming must be found. The aviation brigade will also require advanced camouflage to defeat the advanced sensors that are becoming commercially available.

#### **8.3.1.5. USAF/USN/USMC FIXED WING GROUND SUPPORT**

The Butterfly and Thernnos mine systems in service during the Second Battle of El Alamein had a number of shortcomings. They did not include anti-tank mines in the mix and the anti-personnel mines required physical contact with a target to be activated. Since they were scattered on the surface of the ground, they were also relatively easy to detect and neutralize in the open desert. The lack of a self-destruct feature resulted in the mobility of Axis units being degraded on the occasions that they were forced to deal with their own scattered mines. Since this battle, there have been a number of important countermobility developments with respect to air-scattered mines.

Throughout the 1950 and 1960s the US Air Force worked on a number of scatterable mine systems. Indeed, a number of these were tested or employed during the Vietnam War. One important development was a tripwire fuze that could be used on a scatterable mine (BLU-42/B). Another was the development of magnetic fuzed anti-tank mines with Miznay-Schardin charges that were supposed to bury themselves on impact, such as the Douglas Model 31 (developed by the Marines during the period 1952-1958, but not fielded) or the BLU-45 (which appears to have been used in Southeast Asia). Beginning in the late 1970s and early 1980s, the US Air Force and Navy began fielding the GATOR mine scattering system. This system contained a mix of anti-personnel and anti-tank mines carried as sub-munitions in a cluster bomb container. With the fielding of this system, the US had a potent method for emplacing mines deep in hostile areas. Nevertheless, the GATOR shares some of the same deficiencies as the other current US scatterable mine systems. They have only 4 or 48 hour or 15 day self-destruct times available and are surface scattered. As stated earlier, to reap the maximum benefit from its highly advanced mines, the US must adapt the Wide Area Munition for emplacement by fixed wing aircraft, as well as develop a greater range of self-destruct times for all of these mines. As shown during the Battle of El Alamein, surface scattered mines are often relatively easy to detect and deal with. If the US Air Force and Navy is forced to retire its self-destructing anti-personnel mines because of political pressure, new techniques for protecting the anti-tank mines will have to be developed. Options in this area include camouflaging these mines better or having them self-bury (using their impact energy to go underground or some other mechanism).

#### **8.3.1.6. US MECHANIZED ENGINEER BRIGADES**

As shown during the Second Battle of El Alamein, three combat engineer companies and a support company (field park company) simply can not meet all of the high priority the mobility/countermobility/survivability requirements of a division in combat, in a timely fashion. Indeed, American experience in World War II and since, indicates that most of the time, divisions in combat required 5 to 9 engineer battalion equivalents working in their zone to maintain operational tempo. In this regard, the implementation of the E-Force concept by the US Army in the 1990s, which provided each mechanized/armored division with an engineer brigade of three combat engineer battalions, was a significant organizational step forward. At the same time, the presence of an engineer full colonel at the division as well as engineer lieutenant colonels at the maneuver brigades increases the visibility of significant engineer issues for the maneuver commanders. The presence of the engineer full colonel in command of the engineer brigade, who also serves as the division engineer, is able to ensure that the



lines of authority for the numerous corps and army level engineer units that will still be required in the division's zone are clear while providing the division commander with a highly experienced engineer adviser.

**8.3.1.6.1. Mobility.** The current US divisional engineer brigade organization with three battalions is primarily focussed on mobility missions. However, US Army divisions will lose much of this capability under Force XXI and AAN (Army After Next). Under these initiatives, which embrace a belief in high-tech solutions ('information dominance') and a cavalry mentality of hyper-maneuver ('dominant maneuver'), the engineer brigade headquarters is done away with, while the battalions become much smaller. The futurists are largely wishing away the practical, terrain oriented problems of the battlefield, when in fact, some of the countermeasures most likely to be employed against such a "high-tech" force, are precisely those the combat engineers are intended to counter. Scatterable mines are one of the first responses likely to be employed by an opponent in an attempt to delay a Force XXI/AAN unit. Indeed, mines have accounted for a generally increasing proportion of US casualties (both personnel and vehicular) since the Second World War. Most of our prospective opponents are well aware of US shortcomings in countermine warfare, fewer US combat engineers with the divisions will almost certainly aggravate this disturbing casualty trend. Another method, already used effectively during wargaming exercises, is for the OPFOR (opposing force) to withdraw into difficult terrain such as the mountains, jungles or burgeoning cities of the third world and negate American firepower by only engaging them in heavy close combat or by fighting against the US units using guerilla style tactics. Indeed, it is against 'low-tech,' dismounted opponents such as these (remember Korea, Vietnam, and Somalia) that the US Army has performed most poorly in the 20<sup>th</sup> century. The US Army and the combat engineers have been through these well meaning attempts by the grand strategic thinkers and force-planners to minimize the combat engineer slice to the combat divisions in peacetime before. For example, there were serious proposals in the 1930s of reducing the divisional engineer slice to a single company or even doing away with it completely. However, these misguided efforts were stopped after the prominent role that the German engineers played in the Blitzkrieg through France in 1940 became apparent.<sup>12</sup>

**Engineer Squad Vehicle (ESV).** During the second night of the Battle of El Alamein, as the X Corps attempted to convert the XXX Corps penetration of the Axis main defensive position into a breakthrough, the Royal Engineers could not accompany the 10<sup>th</sup> Armoured Division in their assault on El Wishka Ridge. They lacked the armored personnel carriers necessary to survive and fight in those conditions. Indeed, as stated earlier, General Guderian, considered by many to be the "Father of Blitzkrieg," believed that it was better to armor all of the combat elements of a task force than it was to provide APCs to all of the infantry and leave the engineers on foot or in unarmored trucks.

Due to funding constraints and branch parochialism, this has remained a problem for the US combat engineers since the introduction of the M113 APC. With the combat engineers mounted in dump trucks, the difference in mobility and survivability resulted in the combat engineers being left behind or exposed to crippling casualties before a task could be completed. By the time the combat engineers began to get M113s, the infantry was getting the new M2 Bradleys, thus perpetuating the historical compatibility problems. Combat engineers have proven to be easier to target if they are mounted in vehicles different from the infantry's. Destruction of critical combat engineer assets during breaching operations will decrease the probability of success of that operation. Recently, the Corps of Engineers has decided to equip the heavy combat engineers with the Bradley (keeping the TOW and gun). One of the criticisms leveled at this decision is the Bradley's lack of adequate under armor stowage for tools and engineer munitions. To counter this apparently valid criticism, the engineer school should consider equipping the platoon sergeant with an M-113A3 as a tool carrier (alternatively, the M113A2 may have to be substituted). This would provide increased volume under armor, although with some compromise of mobility and survivability. However, this vehicle could move with the main body and only come forward if needed to provide additional tools or munitions.

Plainly, this effort must be successfully executed if the combat engineers are to be present at the right place, at the right time to ensure the success of the combined arms team. Despite the underlying presumption by the infantry that they are looking out for their soldiers by ensuring that all of the new Bradleys go to them, the fact is, all elements of the combined arms team suffer when one of the Battle Field Operating Systems is neglected. For the future, the Corps of Engineers must aggressively pursue the development and fielding of compatible squad combat vehicles in synchronization with the infantry.



**Mine Detection.** Mine detection proved to be one of the most critical functions performed by the sappers during the Second Battle of El Alamein. The slow progress that probing and handheld detectors could support adversely impacted the mobility of the 8<sup>th</sup> Army's armor. Indeed, it was one of the primary reasons for the failure of Operation Lightfoot to achieve its objectives.

The US combat engineer's current dismounted mine detection capability is not significantly different than that of his British cousin in the campaign in North Africa. Current mine detection techniques are incapable of supporting maneuver units (both mounted and dismounted) at the tempo required by modern operations. US mine detection capabilities must be upgraded with standoff detection systems that are capable of locating metallic as well as low-metal mines and that can be used from airborne platforms (for operational reconnaissance, discussed below), vehicles (for mounted breaching and route clearance operations) and handheld (for dismounted operations).<sup>13</sup> The earlier that mines are detected, the easier it is for a commander to react to them without disrupting his operation, thus minimizing casualties and protecting mobility. Present developments in the area of standoff detection must continue to be adequately funded, rigorously engineered, and fielded. Dismounted engineers need better handheld detectors, capable of finding low-metal mines. As demonstrated at El Alamein, there are situations where it is highly desirable to be able to use this device from the prone. As discussed above, the improvised mine rollers used by British armored units were also found to be inadequate. Although the current US mine rollers and the AN/PSS-12 mine detector are significantly technically better than their Allied predecessors, they suffer from the same operational shortcomings. Plainly, the US combat engineers need standoff mine detection equipment as well as the ability to reliably detect low-metal mines (which made their first appearance in the west at the Battle of El Alamein). Prior to the Second Battle of El Alamein, Allied photo-reconnaissance proved reasonably effective at determining the general nature and extent of the Axis obstacle zone, however, it was unable to provide the detailed reconnaissance information required by the sappers to fully plan their breaching operations.

**Explosive Breaching.** Although the 8<sup>th</sup> Army had some demolition 'snakes' available, the only explosive breaching undertaken during the Second Battle of El Alamein involved the use of bangalore torpedoes by dismounted engineers and infantry against wire obstacles. Apparently the 8<sup>th</sup> Army engineers felt that the demolition snakes were too cumbersome to use in Operation Lightfoot. As a result, the British later developed and used a rocket deployed line charge, called the 'Conger,' in France in 1944. Nevertheless, the US continued to rely on its M3 and M157 demolition snakes for another 15 years, until the fielding of the M173 in the early 1960s. Even then, M173 was very difficult to use, as it was dragged behind a tank until it was needed.

Eventually, the US Army updated its line charge by adopting the US Marine Corps' trailer-mounted M58 MICLIC in the late 1980s. Although the trailer-mounted MICLIC provided improved mobility, the trailer was still less than satisfactory. Finally, during the Persian Gulf War, some of the combat engineers in the 1st Infantry Division improvised the AVLM (Armored Vehicle Launched MICLIC) by welding a frame to an AVLB (Armored Vehicle Launched Bridge) chassis and mounting two MICLICs side by side (the US Marines also solved this problem, in their case, by mounting three line charges vertically in an AAV). During the Gulf War, another shortcoming of the explosive line charge was highlighted. Its performance was significantly degraded against blast resistant mines. When it came time to develop a MICLIC replacement, known as the ESMB (Explosive Stand-off Minefield Breacher), the US Corps of Engineers reverted to the deficient, trailer-mounted arrangement. Although the ESMB, using an explosive net and shape-charge arrangement, achieved nearly 100% clearance against all known anti-tank mines in testing, the Corps of Engineers terminated its development in favor of the now cancelled Grizzly. Considering that it would be very difficult to improve on the performance of the ESMB, future explosive breaching developments should focus on improvements that decrease the weight or cube of the system or increase its survivability. Another option for future development in this area is to pursue artillery or aircraft delivered munitions that provide precision standoff minefield breaching. However, there are no such systems currently in development in the US.

**Mechanical Breaching.** Although the British had begun development of mine clearing rollers as early as 1918, the Second Battle of El Alamein was the first time that the Allies had attempted to use mechanical breaching equipment, in the form of the new Scorpion mine flail, in large scale breaching operations. As described in the text, although showing some promise, the early flails were only marginally effective. Although flails have periodically drawn US interest over the last 56 years, they have never been fielded by the US in any quantity. Nevertheless,

there has been considerable international progress made in flail technology over that period. The US Army has tested improved versions of the flail as they have become available. The most recent example is the Keiler, which was jointly developed between Krauss Maffei (in Germany) and the Israeli Army. This flail, actually a milling machine, is mounted on an M48 tank hull (once again, the engineers get an obsolete hull) and is reported to clear 100% of the mines present to a depth of 25-cm at 0.72 kph. The German Army has ordered 24.

Although the US Army has employed improvised or prototype countermine equipment during the Korean and Vietnam Wars, the US Army lacked significant standardized mechanical breaching equipment until the emergency fielding of the BCS (described above) for the Gulf War. In addition to the BCS, the US Army also developed and fielded the full width mine rake for use on the CEV (Combat Engineer Vehicle). The mine rakes proved to be highly effective. The next step in mechanical breaching was to be the new Grizzly, which was in the late prototype phase of development and was scheduled to enter US service in 2004. The Grizzly, with 4 allocated per mechanized combat engineer company, would have been the first system in US Army history to provide the capability to rapidly breach complex obstacles (Minefields, wire, and anti-tank ditches) in a single, high mobile/survivable platform. However, as impressive as the Grizzly is, its full width blade may not be useable in rocky soils. For this reason, the US should consider acquiring at least two Keilers per mechanized engineer battalion since this system is effective in rocky ground, unlike other mechanical systems currently in the US inventory.

As mentioned above, the British tankers in North Africa found mine rollers to be incompatible with their concept of operations, and therefore the 8<sup>th</sup> Army transferred them to the sappers. Working within the technical constraints imposed by the rollers, the sappers were able to develop techniques for effectively employing them on their pilot vehicles. American experience with rollers in Vietnam and the Gulf War confirm the British decision. The rollers in the BCS should be transferred to the mechanized engineer battalion and configured for use with the Panther. Alternatively, the rollers could be fitted to a Wolverine or AVLB chassis and used for mine reconnaissance, proofing or route clearance.

Another problem encountered by the Allies at El Alamein was the use of scatterable mines in rear areas and against the artillery. Both of these are notoriously short engineer assets. The Allies were forced to detail valuable combat engineers away from their main effort in order to counter this problem manually. Although scatterable mines have remained largely a capability found only with the major powers since the end of the Second World War, this capability is proliferating. The US engineers need to develop and field a system suitable for this task.

**Breach Site Marking and Maintenance.** Effective movement control in the immediate vicinity of a breach site has proven to be critical to the success of a breaching operation. The 8<sup>th</sup> Army understood the necessity of different units using the same marking techniques. This would allow a unit to be shifted to another unit's breach site, without taking unnecessary casualties as a result of misunderstanding the marking techniques. It is also important to mark both approaches to a breach site and the breach lane itself, in order to keep units from accidentally straying into the minefield. The marking system must be clearly visible during day light hours and during periods of limited visibility. It should be noted that dismounted breach sites have different marking requirements that should be addressed through the Squad Sapper Set.

Although the Allies employed a standard method for marking minefields (thus minimizing confusion as units were diverted to different lanes as the battle developed), however, their marking equipment lacked durability under artillery fire. As a result, a number of vehicles were knocked-out by mines when they unintentionally left the safe lane because the markers had been damaged or destroyed. The current US hand emplaced marking systems (Minefield Marking Set #2 and the M133 HEMMS) have the same deficiencies. However, it should be pointed out that the primary breaching systems currently in service, or soon to enter service, with the US Army do not require immediate marking as the track width mine plow in the BCS and the Grizzly (as well as the mine rake) leave no doubt about where they have cleared mines. However, where roller systems or manual neutralization techniques are used, something better than the current marking systems is required. The British developed Pathfinder Marking system has a number of good features to recommend it, not the least of which is the fact that it can be quickly emplaced from under armor. It, or something like it, should be installed on all roller-equipped vehicles as well as the Bradley Engineer Vehicles. However, the pathfinder marker is still no more survivable than the systems it

would replace/supplement. Although no development is currently on going in this area, perhaps consideration should be given to using "Jersey Barriers" (or something similar, possibly large, brightly painted concrete traffic cones) for breaches that will be used for a long period of time. Another marking problem is the movements of units from the near side rally point to the entrance to the breach lane with out getting lost. XIII Corps solved this problem through the use of their 'Snails.' Such an approach should certainly be considered by the US, as they have no other means of marking such a route.

Another recurring problem for the Allies during the Battle of El Alamein was the degradation of the mobility in the breach lanes as more and more vehicles moved forward. The 'Snails' could also be used to help control dust in a breach lane, although the route would continue to deteriorate. Another, more promising option is to acquire portable roadways that can be quickly emplaced by mechanical means. Such systems are currently in use with the British and German armies.

One other problem that presented itself at the Second Battle of El Alamein during the breaching operations and later during the passage of units forward through the breach lanes was the need to recover vehicles that had been immobilized. In the interest of simplicity, initially this should probably be the responsibility of the engineers who are maintaining the breach lane, eventually, after all of the engineer work is done, this responsibility should revert to the military policemen who will have responsibility for controlling traffic through the lanes. To accomplish this task, the engineers should be equipped with M88A2s as they become available.

**Route Clearance Equipment.** The British, French, and Germans had experimented with vehicle-mounted detectors; although none were found to be fit for service. During the pursuit of the panzerarmee after the Battle of El Alamein, the 8<sup>th</sup> Army was forced to employ manual sweeping techniques along the coast road, augmented with Scorpions, pilot vehicles and bulldozers. This technique limited the rate of advance of each Royal Engineer field company to approximately 20 kilometers per day.<sup>14</sup> As a result, Panzerarmee Afrika was able to escape, thus prolonging the campaign by 7 months. For the US, their first encounter with significant route sweeping problems occurred in Korea and has persisted through the Vietnam War and Somalia. However, the South Africans, following the successful appearance of the Rhodesian "Pookie" mine-resistant mine detection vehicle in 1976, have developed and fielded a countermine "train." This train consists of four mine-resistant vehicles that are reported to be capable of clearing routes at over 30 kph against nuisance mining or about 10 kph against a more substantial threat. This train typically consists of two Meerkat mine detection vehicles, a set of towed rollers, a command and control vehicle, and a support/recovery vehicle,<sup>15</sup> although this organization could be varied to suit the mission. This "system of systems" is currently under evaluation by the US Army Corps of Engineers and some of our NATO allies.

**Area Clearance/Demining.** As demonstrated during the Second Battle of El Alamein, it is critical for units to be able to identify safe areas for the deployment/staging of follow-on maneuver forces, the artillery, and logistic units. The only method for clearing (as opposed to breaching) a minefield available to Allied engineers during Operation Lightfoot was dismounted manual clearance using mine detectors, mine probes, and block explosives. This remains the case to this day for the US engineers.

As shown by the fact that many mines remain dangerous around El Alamein to this day, 65 years later, demining is an important strategic consideration. Indeed, the use of mines is wide spread at all levels of conflict. When a war is over, the mines are still there. There also remain significant mine problems in Cambodia, Angola, Afghanistan, and Bosnia to name just a few. The development of an area clearance system would thus help the US to "win the peace." As a result of efforts to address these humanitarian-demining requirements, there have been some promising developments in the realms of mine detection and clearance. US combat engineers can put these developments to effective use. For example, the South Africans have developed vehicle-mounted sniffers that can determine the presence of explosives in an area. Mechanical clearance systems have been developed that may eventually be able to clear mines from large areas fairly rapidly. Such equipment should be placed within the fourth battalion of the divisional engineer brigade or with corps engineer assets.

**Combat Engineer Vehicle.** As shown during the close combat on Mitieriya and El Wishka ridges, close-in heavy fire support is often required to seize an objective. The British lacked such a capability at El Alamein. However, as a result of experiences here and, especially at Dieppe, the Canadian engineers proposed the first



modern Combat Engineer Vehicle (CEV, known to them as an AVRE, (Armoured Vehicle, Royal Engineer)) in time for it to make its debut on D-Day. This class of vehicle fulfills the ancient requirement for heavy-duty, short ranged, direct-fire support. Beginning with the appearance of the battering ram in 1900 B. C. by the Egyptians, through the appearance of the catapult (and related mechanical engines of war), black powder siege artillery, trench mortars and the first tanks; the military engineer has devised ways to overcome fortifications and the challenges of breaching operations. Often, he later loses control of his inventions to the more glamorous infantry or cavalry.

As stated above, the Royal Canadian Engineers proposed the first modern CEV after their bitter experiences at Dieppe in August 1942. The result was called the AVRE and mounted a 290mm spigot mortar (firing an 18.14 kg shell) in a revolving turret on a Churchill Tank. This vehicle first saw combat during the D-Day landings on the British beaches. Germany, Russia and the US also developed vehicles that performed this function during the war. In the German Wehrmacht, the Goliath remote control demolition vehicles as well as the earliest demolitions tanks (modified Panzer Is and IIs), were under the control of the pioneers. Eventually however, the artillery branch expanded its foothold from its assault gun units to include this task. After the Wehrmacht's bitter experiences in urban combat, in Stalingrad (late 1942), the Germans developed and fielded two vehicles with large bore weapons firing from a fixed superstructure. These were the 'Grizzly Bear' (Sturmpanzer IV, with a 12 caliber 15cm howitzer firing a 38 kg. shell) and the Sturmtiger (with a 38cm rocket assisted mortar firing a 345 kg. shell). The sturmtiger was later used with devastating effect in Warsaw in 1944. The Russians began development of these vehicles as a result of their disastrous attack on the Finland's Mannerheim Line in November 1939. In 1940, they began fielding the KV-2 (mounting a 152mm howitzer in a revolving turret) for assaulting concrete fortifications. This design proved to be too cumbersome and was not particularly successful. Later, the Russians fielded the SU-152 assault gun (mounting a 152mm howitzer firing a 40 kg. shell from a fixed superstructure). Like the Germans, the artillery controlled both of these vehicles. The efforts of the US Army Corps of Engineers to develop a CEV during WWII were limited to the prototype T-31, a modified Sherman tank, fitted with various 7.2-inch rocket launcher mountings. None of these ever saw action. In fact, the US would not field a CEV until the appearance of the M60 based M728 in 1967, during the Vietnam War.

A development closely related to the CEV is the flamethrower tank. The first flamethrower tanks appeared in the First World War when the Germans designed their A7V tank to accept either a flamethrower or a machine gun at the various weapons ports, however, there are no reports of this feature having been used in combat. The first combat use of flamethrower tanks appears to have been during the successful final Russian assault on the Mannerheim Line in Finland in March of 1940. During the Second World War, the Germans, British, Italians, and Russians all fielded flamethrower tanks for close combat. Although this type of tank had proven to be extremely useful in urban and other close combat situations, the US effort was limited to a number of improvised systems that were cobbled together in the various theatres of operation.<sup>16</sup> The US did not field a standardized flamethrower tank until the M67 (based on an M48 hull) was produced in small numbers in 1955-56. It was withdrawn from service after the Vietnam War.

Recently, the British and Americans have retired their combat engineer vehicles because of cost and maintenance factors. Also, the old US M728 CEV, which could be fitted with a superb full width mine rake, simply could not keep pace with the newer M1 tank. As a result, the US Army can no longer employ its highly effective full-width mine rake. The retirement of the British Centurion Mk 5 AVRE and the US M728 vehicles leaves only the French among the western Allies with the foresight to keep a modern CEV (the AMX-30 EBG) in service. The AMX-30 EBG has a 142mm demo gun (firing a 17 kg shell), a full width blade and an arm for digging. It can also carry mine dispensers similar to the US ground Volcano system.

Plainly, the need for a CEV has been proven repeatedly in combat over the last 80 years. The US Corps of Engineers needs to equip its mechanized engineer battalions with an M1 based version of the CEV incorporating a large bore, low velocity gun. This is especially critical for the US Army, because the 120mm gun on the M1A1 tank does not have a high explosive round that is suitable for "bunker-busting." In an era when the US expects to face more combat in urban areas, it is essential that the combat engineers possess the ability to provide the required short-range heavy firepower necessary to maintain the mobility of the force. At a minimum, the old 165mm demolition guns should be mothballed and stockpiled for later use (the mountings in the M1 are compatible with those of the 165mm gun), when the US combat engineers will certainly be ordered to execute this mission again. Any future CEV design should include the option of mounting a flamethrower in addition to the demolition gun.

**Bulldozers.** As demonstrated by the South African engineers during the pursuit after El Alamein, commercial, unarmored bulldozers are very valuable assets for maintaining the mobility of a mechanized force, however, they are too vulnerable and too slow. In an attempt to address the vulnerability issue, add-on armor packages have been improvised in the field or designed and manufactured. Another interim solution has been the mounting of bulldozer blades on tanks. This provided both improved protection and mobility; however, tank transmissions are not up to the task of bulldozing and are easily burned out. The result is a vehicle that can push satisfactorily but can undertake only light digging. Beginning in the late 1950s, the US Army initiated the development of the Armored Combat Earthmover (ACE), which was a supposed to be a compromise between the digging ability of a bulldozer and the armor protection of a tank-dozer. It took the US Army 30 years to complete the development and fielding of the ACE, just in time for the Gulf War.

During the Gulf War, the ACE revealed several technical deficiencies. The vehicle, which is often employed ahead of the M1 tank, only has a one-man crew (inherited from its bulldozer predecessor), inadequate armor, and no defensive armament. A two-man crew would be more robust and more likely to accomplish missions under fire. The inadequate armor protection increases the probability of mission failure if the ACE cannot survive where the Bradleys and M1s are operating. The lack of defensive armament could be a fatal deficiency in restricted terrain where areas of dead space can negate the value of over-watching units, as the Russians recently rediscovered in Chechnya. Nevertheless, the ACE is a significant improvement over the bulldozer with improvised armor in combat. The US Army should complete fielding the ACE. However, any future design should include a two-man crew, greater armor protection and defensive armament, as well as a new transmission that will allow the vehicle to dig like a bulldozer but move like an M1. The unglamorous task of developing a new transmission will be expensive and would seem to be a good candidate for a cooperative, international program to spread the cost.

Although the Axis lacked the technical ability to dig anti-tank ditches in the rocky ground at El Alamein, the large numbers of road craters blown by Axis engineers during the withdrawal caused significant delays for the Allies. They were a key element in the successful escape of the badly mauled panzerarmee. The craters were repaired using bulldozers, but too much time was required. Although the British had built the first AVLBs in 1918 and the Germans had successfully employed them during the campaign in France in 1940, the 8<sup>th</sup> Army lacked an Armored Vehicle Launched Bridge (AVLB). Nevertheless, the British would field a highly effective AVLB on a Valentine tank chassis in time for the later campaigns in North Africa, Italy and Northwestern Europe.

The development of a standard AVLB for the US Army was slow getting started. Although the US 1<sup>st</sup> Armored Division experimented with an improvised AVLB in early 1945, it would take several prototypes on different tank hulls before the US finally fielded an AVLB on an M48A2C hull (in the late 1950s) and on the M60 hull (entering production in 1964). With the fielding of the M1 tank, the M48/M60 based AVLB was unable to keep up with the M1 and Bradley equipped maneuver units that it was intended to support. In addition, as the M48/M60 chassis has aged, it has become a significant maintenance problem, especially as they have become low-density items with the retirement of the M60 series tanks. The Wolverine, which was scheduled to enter service in the year 2000 and would have addressed many of these shortcomings, has been cancelled.<sup>i</sup>

**8.3.1.6.2. Countermobility.** The engineer battalions, found in the panzerarmee and the 8<sup>th</sup> Army, were capable of emplacing about 10km of minefield per day. The Axis engineers, lacking most items of modern earthmoving equipment, could not dig anti-tank ditches (except with pick and shovel, this was generally impractical in the hard, rocky North African ground), while the few bulldozers available to the 8<sup>th</sup> Army were generally too valuable to divert to such work. However, it should be pointed out that the 8<sup>th</sup> Army did anchor the northern end of its defensive position at El Alamein with a large anti-tank ditch. The modern US mechanized/armored division, although its engineer brigade is focussed primarily on providing mobility support to the maneuver brigades, possesses a much greater capability than its predecessors to emplace obstacles, by a factor of about 13. The

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<sup>i</sup> Although float bridging was not required during operations in North Africa by either side, experience elsewhere during WWII indicated that the capability to bridge two rivers at a time was required to maintain the operating tempo of armored/panzer divisions. It was also found that this capability had to be integral to these divisions as corps and army level units proved to be incapable of responding in a timely fashion. Based on this experience, it would appear that one multi-role bridge company should be assigned to each US mechanized engineer brigade.

engineer brigade can emplace over 80 km of minefield per day plus 16 km of anti-tank ditch. The rest of the division's mine laying assets can emplace another 26 km of scatterable mines, making for a total daily obstacle output of about 120 km (plus another 15 km if the infantry helps with emplacing their obstacles). However, although the ground Volcano system provides a significant capability to emplace mines, the decision to mount it on unarmored vehicles such as the M548 tracked carrier or the 5-ton dump truck has greatly reduced its survivability on a lethal battlefield. Plainly, the decision by the British and French engineers to mount their mine scattering systems on armored vehicles such as the Alvis Stormer and the AMX-30 EBG has distinct advantages. As a result, their systems will be more flexible in combat.

A further development in the area of anti-tank ditching was the Russian adoption of large rotary trenchers. These devices can excavate 400 to 500 cubic meters of soil per hour, which translates into 90 to 110 meters of anti-tank ditch per hour, compared to about 70m per hour (350 cubic meters per hour) for a Dozer/Dozer team. However, the bulldozer is a more versatile piece of equipment, so the relatively minor gains in performance with the rotary trenchers does not appear to offset its lack of flexibility. Another interesting development in the area of anti-tank ditching was the US developed TEXS system. This system consisted of pre-emplaced pipe installed along a threatened border, into which a two-man crew could pump explosive slurry from a truck. Then, the charge could be command detonated when needed, thus allowing for surprise and flexibility.

**8.3.1.6.3. Survivability and General Engineering.** As shown at the Battle of El Alamein, survivability support is critical for all key assets within a division. Like the mechanized infantry battalions, the engineer squad vehicles need to be able to rapidly self-entrench, since their own organic digging assets will normally be fully employed working for other units. The mechanized engineers will also require advanced camouflage to defeat the advanced sensors that are becoming commercially available.

As superbly demonstrated by General Montgomery the Second Battle of El Alamein, camouflage and deception are vital elements of the survivability mission area. Employed properly, they can provide a critical, even a decisive advantage in combat. Although the US Army has made quite effective use of these, as shown in the preparations for the invasion of Europe and Operation Desert Storm, this capability is neglected at the division level and below. Effective decoys must be developed and fielded to increase the ability of the US Army to deceive its opponents.

Although current US maneuver, mechanized engineer and artillery battalions have (or can be readily adapted to have) significant organic survivability capabilities, this is simply not the case for other highly vulnerable, high priority assets within a mechanized/armored division's area of operations. These assets include the combat aviation brigade, the artillery counterfire radars, corps Patriot units, command and control nodes, and the division support command (DISCOM). With the current/projected OPTEMPO requiring the combat engineer battalions to be forward with the maneuver brigades, the task of providing this support is expected to fall to corps and army level engineer battalions that are pushed forward into the division rear area. This situation presents a number of problems including integration and command/control issues. Since these survivability requirements will always be present in wartime, it would appear to be advisable to form a fourth engineer battalion under the engineer brigade. This battalion should consist of a sapper company (with one light sapper and two mechanized/armored engineer platoons, for use with the division cavalry squadron), a combat support equipment company (CSE), a multi-role bridge company (MRBC, augmented with portable roadway dispensing system), a camouflage/deception company (including signals elements), a workshop company (discussed later), and an attached EOD (Explosive Ordnance Disposal) team. The CSE should be tailored to provide survivability support to the high value assets in the division rear area and to provide MSR maintenance. It should include the area mine detection and clearance assets. If such a battalion can not be assigned to the divisional engineer brigades during peacetime due to financial, political, or deployability reasons, then consideration should be given to creating habitually associated corps engineer battalions that will be attached to the divisional engineer brigade as they reach the theatre of operations.

**8.3.1.6.4. General Discussion of Combat Engineer Heavy Tracked Vehicles.** Given the offensive nature of US mechanized and armored divisions, the design of the divisional combat engineer battalions is focussed primarily on mobility tasks. Considering the fact that the US expects most conflicts for the near and mid term to be expeditionary in nature, it is necessary to design these heavy units (and their successors under Force XXI and AAN) with an eye toward strategic mobility. As a result, it is necessary to maximize the utility of the combat engineers as



a function of size, especially with respect to countermobility and survivability. Although it would be unwise to preclude any capabilities from our combat divisions that are required to accomplish all reasonable missions, in all reasonable terrain types, against all reasonable opponents; at the same time, the units still have to be able to get to the fight in a timely manner. Historically, US Army has been opposed to special purpose vehicles as a result of an admirable desire to limit unit size in the interest of deployability. However, it is a false economy to risk mission failure by compromising combat performance for easy deployability. The mechanized/armored divisions (as well as their Force XXI/AAN successors) should be designed for a time-phased deployment, with various combat support/combat service support modules deployed only as needed.

A review of the required vehicle mounted combat engineering capabilities above shows several trends that can be capitalized to good effect. First, there are two types of engineer combat vehicles that require tank hulls to be effective on the battlefield, the CEV and the AVLB, one turreted, one not.<sup>i</sup>

The main mission of the un-turreted hull is to provide assault bridging of short gaps. This configuration should be downloadable such that the front of the hull could mount a full-width mine rake/plow, track width mine plows, mine rollers (full or track width), or a bulldozer blade for removing roadblocks or entrenching. As demonstrated very well by the British 79<sup>th</sup> Armoured Division, multiple capabilities can be combined on a single platform. This was reinforced by the "AVLM" (Armored Vehicle Launched MICLIC), which was used to carry two MICLICs and could be adapted for an ESMB type system. Additionally, Volcano-type scatterable mine dispensers, portable roadway, triple standard concertina obstacle dispenser, smoke projectors, counter-fortification hedgehogs (firing high explosive or fuel-air explosive rounds), or three or more pipe fascines could be carried. These top-mounted loads should be designated in logistic channels as expendable class IV/V packages. Other mechanical equipment, which would have to be transported by the engineer battalions when not in use, could include a Keiler type flail, rotary ditcher, or large smoke generators (to conceal breaching operations etc.). Ultimately, it would appear to be highly desirable to build this chassis in a front-engined configuration. Then, the vehicle could be used as a heavy assault armored personnel carrier that would permit combat engineers and infantry to be transported under heavy armor against a fortified location to conduct a dismounted assault. If configured with a forward engine, this vehicle should be fitted with a double rear hatch to allow for a rapid, covered dismount. This general approach was first demonstrated during the First World War by the German A7V and the British Mark V\* tanks. These tanks were designed to carry significant numbers of personnel within the armor for use as dismounts for assaulting fortified objectives. This concept was also pursued in the Canadian Ram tank (called a "Kangaroo") in WWII and later by the Israelis using modified, captured T-55s and recently in the Merkava tank. A properly designed vehicle would effectively give the combat engineers a highly versatile "Swiss Army Knife" which could be used to accomplish a variety of combat tasks. Likewise, the turreted CEV replacement should be designed to accept a wide variety of offensively oriented combat engineer equipment.

Plainly, because both types of vehicle will likely work in very close proximity to hostile mines, and since none of the countermine methods is 100% effective and errors are to be expected, it would be prudent to fit all of the tracked combat engineer AFVs in the mechanized engineer battalions with mine resistant tracks and suspensions.

**8.3.1.6.5. Combat Engineer Wheeled Vehicles.** Additionally, as with the tank and mechanized infantry battalions, the unarmored, wheeled support elements, must also be equipped with mine resistant vehicles.

**8.3.1.6.6. Combat Engineers as Infantry.** During the Battle of El Alamein, at least half of the German pioneer battalions had to be committed as infantry in an attempt to stabilize the line. Given the historically high frequency of combat engineers being tasked to fight as infantry, as much as possible, they should be organized and equipped like their infantry counterparts, particularly with respect to anti-tank and automatic weapons. With the exception of the Germans, who have routinely trained and employed their pioneers as specialized assault troops, most countries only expect their engineers to assume infantry missions of a defensive sort. However, offensive, *sturmponier* tactics have served the Germans very well and should be adopted by the US Corps of Engineers. The

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<sup>i</sup> Alternatively, even this could be reduced to a CEV based on an assault gun configuration, with the demo gun placed in a fixed mount in the hull, similar to the German and Russian vehicles of WWII. However, this extreme approach would degrade the combat responsiveness of a CEV in combat, especially in close quarters fighting in cities and fortified areas, where a turreted vehicle has many advantages over a fixed gun mount.

support/service support minded culture of the Italian and American military engineers seems to have shortchanged the maneuver soldiers by denying them the very best support in combat. In addition to the necessary training, the combat engineer platoons should also be equipped with other special-purpose close combat equipment including man-pack flamethrowers, collapsible scaling ladders, and “bunker busters.” Most historical literature on combat engineering indicates that engineers being tasked to fight as infantry is a fairly common phenomena, especially when an army is defending or in retreat. In this respect, retaining the 25mm Bushmaster and the TOW missile launchers on the engineer Bradleys is highly desirable. In addition, the engineer battalion headquarters should also be equipped and manned like an infantry battalion headquarters as much as possible. One of the key shortfalls is the present lack of a tracked mortar platoon in the US combat engineer battalions. It should be pointed out that the modern mortar was another combat engineer invention, originating with the German pioneer’s minenwerfers of the First World War. Indeed, both the Germans and Americans retained mortars under their engineer battalions through the Second World War. This capability should be restored to the modern US combat engineer battalions. During normal operations, this platoon should be placed in direct support of their supported maneuver brigade. This platoon should revert to engineer control during breaching operations (to fire smoke) and in the event the engineers are directed to reorganize as infantry.

**8.3.1.6.7. Combat Engineer Command and Control.** As demonstrated by the experiences of the Allied engineers during the Battle of El Alamein, combat engineer units must be provided with the best available communications equipment. Poor communications between the engineers and their maneuver counterpart prevented the tankers of the 10<sup>th</sup> Armoured Division from exploiting the breaches of the last tactical minefields before sunrise on the morning of 24 October. The requirement for precise navigation by the engineers was also vividly demonstrated during this battle.

The modern US Army engineers are well aware of these requirements and are working to insure integration within the communications systems currently in development for the maneuver forces. Another issue that must be carefully considered by the US engineers is the need for a full colonel to command the engineer units in the divisional area. As stated earlier, the realities of combat frequently force the US Army to push significant engineer assets forward to committed combat divisions. The presence of an Engineer full colonel to assume command of these units prevents the personality conflicts possible if all of the senior engineer officers involved are lieutenant colonels, thus promoting unity of effort. In addition, this will tie the engineer officer corps more tightly to the rest of the combat arms by offering greater advancement opportunities to officers who specialize in combat engineering, as opposed to focussing on non-combat assignments. By generating greater high-level interest in insuring the effectiveness of the combat engineers, the Corps of Engineers will be able to provide more effective support to their maneuver brethren. This should also help the engineers compete for modernization dollars by giving them a stronger presence in the combat divisions. Another command and control shortfall that needs to be addressed is the need for engineer staff officers with the combat aviation brigade and the division artillery. These additional positions must be created and filled if the combat engineering capabilities and requirements of these units are to be completely integrated into combat operations.

**8.3.1.6.8. Rapid Prototyping Facilities.** As shown by the 8<sup>th</sup> Army workshops, the ability of the Royal Engineers in the field to react to evolving conditions by improvising equipment solutions gave them a important advantage by providing them with flexibility. This capability would also allow them to minimize many hostile innovations. The highly capable workshops of the 8<sup>th</sup> Army were able to produce flails, rollers, improvised detectors, improvised mines, and decoys.

Such flexibility would be highly advantageous for modern US combat engineers facing the uncertainties of the 21<sup>st</sup> century. The current US procurement system is so cumbersome that rapid prototyping of special equipment to meet unusual combat situations cannot be done in a timely fashion within its constraints. Indeed, the timely development of material is nearly impossible under the current system, which is designed to optimize monetary savings at the expense of time (and possibly soldiers lives). As shown repeatedly on the field of battle, operations involving combat inevitably precipitate urgent needs for specialized equipment. The rapid development of material to fulfill these needs is essential to minimizing the human and resource costs of future operations.

Historically, experimental units, with the capability to rapidly develop their own equipment such as the German Assault Battalion “Rohr” (the original stormtroopers), the British 79<sup>th</sup> Armoured Division (“Hobart’s

Funnies"), and the Rhodesian Pookie Troop have had an impact on the nature of combat far beyond the small size of the units involved. These units could serve as a model for a solution to the problem of providing specialized equipment in a timely fashion. The pioneers of Storm Battalion "Rohr" were instrumental in developing the weapons and techniques that enabled the Germans to break out of four years of trench warfare and regain operational maneuver on the Western Front during the Ludendorf Offensives in the spring of 1918. As a result, the Germans nearly captured Paris. It would require the mass employment of the tank for the Allies to regain similar operational maneuverability. The British 79<sup>th</sup> Armoured Division was equipped with a large variety of locally developed; special purpose armored combat engineer vehicles. The specialized vehicles developed in the 79<sup>th</sup> included the Amphibious Sherman tank, the Sherman Crab flail tank, the Crocodile flamethrower tank, bridge layers, and minefield breaching tanks. General Hobart's division was to prove instrumental in minimizing British casualties on D-Day. The 79<sup>th</sup> continued to provide critical support throughout the campaign in Western Europe in 1944 and 1945. The Rhodesian Pookie Troop developed one of the most successful mine detection vehicles ever fielded anywhere. Much of the equipment used by the troop was locally fabricated within the unit's workshop. This unit was critical to restoring some degree of normalcy to the Rhodesian backcountry by neutralizing the communist terrorist's mine laying campaign. The adaptability and responsiveness of all of these units gave their superiors significant tactical and operational advantages over their more conventionally minded, less adaptable opponents, thus allowing them to operate well within the equipment development cycle of their opponents and maintain a significant technological edge.

The successful inclusion of such shops in the US Army would require them to have expertise in the areas of mechanics, electronics and munitions at a minimum and be deployable with their parent unit. They would require sufficient facilities to fabricate a wide variety of simple, useful devices. The designs for these devices could be drawn from existing technical data packages or developed internally. The dissemination of information on the successes and failures of these rapid prototyping shops with in the design community and the rest of the Army would be very important so as to minimize needless duplication. It would also be very important to support these shops with small but effectively stocked technical libraries. In combat situations, these workshops could be supplemented with additional expertise deployed from the Army Materiel Command (AMC). Such an organization would considerably enhance the flexibility and responsiveness of US tactical units at a time during which the US Army must be prepared to fight smarter with less.

### **8.3.2. DISMOUNTED/WHEELED COMBAT ENGINEERING EQUIPMENT**

#### **8.3.2.1. US LIGHT INFANTRY BATTALIONS**

As demonstrated by the experiences of the New Zealand Infantry on Miteiriya Ridge, dismounted infantry must be able to rapidly self-entrench, especially after the seizure of an objective. Since it is usually difficult or impossible to get engineer digging assets forward, after the seizure of key terrain, to assist in the infantry in the transition to the defense, the infantry are frequently exposed to increased risk from heavy artillery fire and counterattacks. Indeed, the infantry are frequently comparatively low priority for entrenching support from the combat engineers. Using standard pick and shovel methods, it takes several hours of uninterrupted work to dig adequate foxholes. To address this problem, US infantry need to take full advantage of the recently fielded FPOC (Fighting Position Overhead Cover) by including it in their training and unit basic load. More importantly, the XM 300 Badger (explosive fighting position excavator) should be accepted for service use and also incorporated by the units. In many cases, these two steps will reduce the time required to dig in by 50% or more. In addition, these assets should be integrated with advanced camouflage to defeat the advanced sensors that are becoming commercially available.

#### **8.3.2.2. US LIGHT/WHEELED COMBAT ENGINEER BATTALIONS**

The current US light divisional engineer battalion organization with three line companies is primarily focussed on countermobility and survivability missions. The mobility support to the infantry is provided primarily by the sapper platoons using expendable munitions such as APOBs and Bangalore torpedoes (as well as manual techniques) to breach protective obstacles. As shown during the Second Battle of El Alamein, three engineer companies and a support company simply can not meet the mobility/countermobility/survivability requirements of a 'light' division (like the 2<sup>nd</sup> New Zealand Division) in combat, in a timely fashion. Indeed, American experience in



World War II and since, indicates that most of the time, divisions in combat required 5 to 9 engineer battalion equivalents working in their zone to maintain operational tempo.

**8.3.2.2.1. Mobility.** As demonstrated by the Allied engineers during the Battle of El Alamein, unarmored trucks are too vulnerable for effective use with dismounted/wheeled engineers. The US Corps of Engineers should equip its light combat engineer units with a light, mine resistant, wheeled APC similar to the South African Casspir (see earlier discussion) but with 5<sup>th</sup> generation mine protection in place of the currently used 2 ½ and 5 ton dump trucks. The dump truck has repeatedly proven to be unsuited for use as a combat engineer squad vehicle and should only be assigned to light equipment platoons, combat support equipment companies, combat heavy battalions and some bridging units. The fielding of a Casspir type vehicle in place of the current dump trucks should not change the deployability of these units. At a bare minimum, the forward deployed, light combat engineer HMMWVs should have the same level ballistic protection as the HMMWVs employed by the military police in the rear areas.

Most of the light engineers' limited mobility equipment is focussed on supporting their division's towed artillery and logistics units. One curious facet of the US light divisions is their complete lack of float bridging. Considering the low military load classification of most vehicles found in these units, one or two sets of Light Tactical Raft (LTR) would go a long way toward meeting most needs for these divisions, without severely impacting their strategic deployability.

**Handheld Mine Detection.** As discussed earlier, the US combat engineer's current dismounted mine detection capability is not significantly different than that of his British cousin in the campaign in North Africa. Current mine detection techniques are incapable of supporting maneuver units (both mounted and dismounted) at the tempo required by modern operations. US mine detection capabilities must be upgraded with standoff detection systems that are capable of locating metallic as well as low-metal mines and that can be used from airborne platforms (for operational reconnaissance), vehicles (for mounted breaching and route clearance operations) and handheld (for dismounted operations).<sup>17</sup> The earlier that mines are detected, the easier it is for a commander to react to them without disrupting his operation, thus minimizing casualties and protecting mobility. Present developments in the area of standoff detection must continue to be adequately funded, rigorously engineered, and fielded. Dismounted engineers need better handheld detectors, capable of finding low-metal mines. As demonstrated at El Alamein, it is highly desirable to be able to use this device from the prone.

One area of improvement over the equipment available to the Royal Engineers at El Alamein, for use during mine detection, is in the present availability of advanced body armor. However, significant improvement is still required. The PASGT vest and the Kevlar helmet provide the only protection; currently available to dismounted personnel engaged in breaching operations. This amount and quality of coverage is inadequate. Portions of the soldier's body are still unprotected, and even the armored portions are still vulnerable to small arms fire and high velocity fragments. Although the current US body armor system will significantly reduce the severity of many types of wounds, the weight of armor presently required to make a sapper truly 'bullet-proof' is unacceptable. Plainly, continued research in this area is necessary.

**Explosive Breaching.** The Bangalore torpedo, which appeared before the First World War, was the primary explosive breaching system available to the Allies during the Second Battle of El Alamein. Although this system has some capabilities against mines, it is normally used against tactical and protective wire obstacles. The Bangalore torpedo still remains the primary means of explosive breaching available to the light US combat engineer, more than 85 years after its introduction. As shown repeatedly, the Bangalore torpedo is heavy to carry and time consuming to employ. Furthermore, its emplacement requires excessive exposure of personnel to hostile fire while breaching complex obstacles.

The current US set of bangalore torpedo weighs 198 pounds, breaches a footpath 15 meters in length, and requires 5 minutes for an engineer squad of 8 men to emplace in ideal circumstances. Fortunately, the US has developed and fielded an effective supplement to the Bangalore torpedo. The APOBS (Anti-Personnel Obstacle Breaching System), which was influenced by the earlier Israeli POMINS design, weighs approximately 120 pounds, breaches a footpath 50 meters in length, and requires a two man crew 2 minutes to prepare it for firing with a total

deployment time of 3 minutes. However, because the APOBS cannot be used in heavily vegetated areas, the Bangalore torpedo must be retained for use in heavily vegetated areas.

**Assault Engineer Equipment.** As stated earlier, fortification reduction is one of the oldest combat engineer missions, dating back to the time of the Hittites and Assyrians. As demonstrated at El Alamein, the requirement for a dismounted force to be able to destroy fortifications in close combat remains. Three types of combat engineer systems have proven particularly useful to the dismounted sapper in this regard, the shoulder-fired “bunker buster,” the flamethrower, and hand emplaced demolitions.

With the retirement of the aged M67 90mm recoilless rifle, the US combat engineers now lack an adequate dismounted, standoff “bunker buster.” However, there are a variety of multipurpose weapon systems currently available (such as the Shoulder-launched Multipurpose Assault Weapon (SMAW) or the Karl Gustav) that could fulfill this role and are under consideration. It is highly desirable that the weapon selected be lightweight and able to fire a variety of munitions including bunker-defeat, anti-armor, APERS (flechette), high explosive, and incendiary rounds.

Since the Vietnam War, the US Army has placed its inventory of flamethrowers in war stock. As a result, personnel are no longer trained to use this highly effective weapon which has proven to be very useful at clearing hostile trench lines and strongpoints. The US combat engineers need to pursue the development of a safe, lightweight replacement for the flamethrower.

**Route and Area Clearance Equipment.** See earlier discussion. Such equipment should be assigned to and used by the light engineer battalion’s A&O (Assault & Obstacle) Platoon.

**8.3.2.2.2. Countermobility.** As discussed earlier, the engineer battalions found in the panzerarmee and the 8<sup>th</sup> Army were capable of emplacing about 10km of minefield per day. Thanks to the recent fielding of the ground volcano system the current US light divisional engineer battalion can emplace about 30 km of obstacles per day. The rest of a light division’s mine laying assets can emplace another 6 km of scatterable mines, making for a total daily obstacle output of about 38 km (plus another 15 km if the infantry helps in emplacing their obstacles).

**Conventional Mines.** Although current U.S. conventional mines were developed before the Vietnam War, many other countries have fielded much more advanced conventional mines. The US Army has become increasingly reliant on scatterable mines. Some engineers believe, based on NTC experience, that hand emplaced mines are too time consuming to lay. However, NTC simulates only high-intensity, high-tempo combat. As can be seen from operations in Korea, Vietnam, Somalia, and Bosnia, not all combat missions are like Operation Desert Storm. Indeed, the long operational life of conventional mines is a distinct advantage in some situations, particularly stability operations such as the Korean DMZ or the protective minefields around Guantanamo Bay. In these circumstances, the long term use of scatterable mines with self-destruct times of 15 days and less would be logistically and politically unacceptable. In addition, there are a number of light infantry divisions, with considerably less obstacle output capability than the mechanized/armored divisions to which the ability to hand emplace mines represents their primary mine-laying potential, with their scatterable systems routinely held in reserve.

The new conventional mine features that have been developed outside the US include: blast resistance, better camouflage and concealment, integral electronic anti-handling devices, improved kill mechanisms, and remote control on/off. For example, the Italian manufactured TCE-6 is a blast AT (antitank) mine comparable to the M-19 AT mine. However, the TCE-6 can be turned on and off remotely, thus enabling units with the controller to safely traverse an emplaced minefield without leaving gaps and lanes for hostile forces to exploit. In addition, the TCE-6 is blast overpressure protected and can be equipped with an integral anti-disturbance device as well as a self-destruct option. The Italian manufactured VS-HCT2 is a full-width attack AT mine comparable to the M-21 AT mine. The VS-HCT2 has a blast overpressure protected seismic/magnetic fuze which can be programmed to self-destruct or self-neutralize for up to 180 days. The VS-HCT2 can also be equipped with a remote control system (similar to the TCE-6) or an integral anti-disturbance device. The French manufactured Miacah F1 is an off-route AT mine with a range of 80 meters. Although the U.S. has developed a similar mine, the M66, it was never

fielded. The Miacah F1 (when used with its advanced infrared fuze) can not be defeated by currently available explosive and mechanical breaching techniques. The Italian manufactured VS-AR-4 is an antihandling device that can be attached to most of the Italian mines. It is comparable to a series of U.S. manufactured device, most of which were developed in World War II. The VS-AR-4 has an anti-tilt switch with an electronic arming delay, therefore, it is much safer and easier to install than U.S. antihandling devices. None of this technology is new to the U.S., indeed, many of these features can be found on US scatterable mines. It would not be technically difficult to employ this technology in conventional mines. The easiest “fix” would be to simply procure advanced conventional mines from US allies.

**Scatterable Mines.** As shown by the Allied engineers during the Second Battle of El Alamein, engineers need to be able to rapidly emplace mines during an advance for flank security and as protective obstacles once the final objective has been taken. US light engineers need the capability to rapidly scatter state-of-the-art mines. The new MOPMs is too heavy and cumbersome to transport by hand for any distance. The light engineers need a smaller, lighter man-pack mine scattering system.

**Wire Obstacle Emplacement.** As shown by the experience of the German pioneers at El Alamein, the manual method of wire obstacle emplacement takes too long and is very labor intensive. In addition, current barbed wire and concertina are vulnerable to Bangalore torpedo and artillery fire. However, US engineers continue to “make do.” Nevertheless, the current manual method of emplacing wire obstacles should be supplemented by a palletized system that can dispense blast resistant wire entanglements (possibly made from wire rope) from the back of a vehicle or trailer. This will significantly reduce installation time for the engineers who typically have many more tasks to perform in a defensive situation than there is time available.

These wire obstacles would also be enhanced by the inclusion of caltrops and concertina staples to discourage infiltration attempts. Standard obstacle packages containing all of the required materials should be available as standard, pre-configured loads from the class IV supply point.

**8.3.2.2.3. Survivability.** Most of the light engineer battalion’s survivability efforts in these divisions are focussed on the aviation brigade and the towed artillery as well as command/control, and logistic nodes. However, the available organic assets are inadequate. Indeed, the modern US light engineers lack the compressors and jackhammers that proved so essential to digging the 8<sup>th</sup> Army at El Alamein.

**8.3.2.2.4. Combat Engineers as Infantry.** See earlier discussion in section 8.3.1.6.6.

**8.3.2.2.5. Rapid Prototyping Facilities.** See earlier discussion in section 8.3.1.6.8.

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## CHAPTER ENDNOTES

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<sup>2</sup> *Combined Arms Breaching Operations*, FM 90-13-1, Department of the Army, Washington, D. C., 28 February 1991.

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<sup>4</sup> *Mine/Countermine Operations*, FM 20-32, Headquarters, Department of the Army, Washington, D. C. 29 May 1998.

<sup>5</sup> *Explosives and Demolitions*, FM 5-250, Headquarters, Department of the Army, Washington, D. C. 30 July 1998.

<sup>6</sup> “After Action Report, Operations Desert Shield and Desert Storm,” by William C. Schneck, US Army Belvoir Research, Development and Engineering Center, November 1991 and “After Action Report, Operation Restore Hope,” by William C. Schneck, US Army Belvoir Research, Development and Engineering Center, June 1994.

<sup>7</sup> *Staff Officers’ Field Manual, Organizational, Technical, and Logistical Data Planning Factors*, (Volume 2), FM 101-10-1/2, Headquarters, Department of the Army, Washington, D. C. October 1987.

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<sup>9</sup> *Mine/Countermine Operations*, FM 20-32, May 1998, pages 10-14 to 10-18.

<sup>10</sup> “Hardening of Armored Vehicle Suspension System Components,” DTIC # AD B069-394.

<sup>11</sup> “The Development of Mine Resistant Vehicles,” by William C. Schneck, Proceedings of the Fifth Annual TACOM Combat Vehicle Survivability Symposium (U), Volume I-Unclassified Session Papers, April 1994.

<sup>12</sup> *The Corps of Engineers: Troops and Equipment, United States Army in World War II, The Technical Services*, by Blanche D. Coll, Jean E. Keith, and Herbert H. Rosenthal, Center of Military History, Washington, D. C., 1975 (reprint), pages 1-26 (especially page 12).

<sup>13</sup> *The United States Army Engineer After Action Report for Operations Desert Shield and Desert Storm*, US Army Engineer School, Ft Leonard Wood, Missouri, July 1993, pages mobility-4 and mobility-5. Henceforth identified as *Engineer School AAR ODS*.

<sup>14</sup> *Mine/Countermine Operations*, 30 September 1992, page 10-1.



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<sup>15</sup>"South Africa Hones Land-Mine Sweeping," by Rupert Pengelley, International Defense Review, 2/1993, page 134.

<sup>16</sup>Flame On! U.S. incendiary Weapons, 1918-1945, by John W. Mountcastle, White Mane Books, Pennsylvania, 1999, pages 63 and 99-101.

<sup>17</sup>Engineer School AAR ODS, pages mobility-4 and mobility-5.

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